DOCUMENT RESUME

ED 077 226 EM 011 135

TITLE	Television for Higher Technical Education of Workers. Final Report On a Pilot Project in Poland. Reports and Papers on Mass Communication Number 67.
INSTITUTION	United Nations Educational, Scientific, and Cultural Organization, Paris (France). Dept. of Mass Communication.
REPORT NO	UNESCO-RPMC-67
PUB DATE	73
NOTE	76p.
AVAILABLE FROM	UNIPUB, Inc., P. O. Box 433, Murray Hill Station, New York, N.Y. 10016 ($2.65)
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Adult Education; Adult Students; Chemistry; Educational Television; Electronics; Geometry; *Instructional Television; Mathematics; Mechanics (Physics); Part Time Students; Physics; Pilot Projects; Program Descriptions; *Technical Education; Televised Instruction; *Television
IDENTIFIERS	*Poland; Polish Ministry of Higher Education; Polish Television

ABSTRACT

The "Television Polytechnic" program of 1966 - 1970 was a joint effort of the Polish Ministry of Higher Education and Polish Television to provide televised education for working students. The subjects taught were those normally included in the first two years of the higher technical schools--math, physics, geometry, chemistry, mechanics of materials, and electrotechnics. Each semester lectures were given by professors from the higher technical schools, and students were provided with texts and access to consultation centers. Assessment indicated that television lectures were helpful to regular students as a complement to their classroom experiences and were a useful means of providing basic instruction to those not enrolled in a higher school. Preparatory and first year television courses will remain as permanent elements in the Polish educational system and the recent implementation of a second channel will lead to an expansion of programs, including many aimed at post-graduate audiences. (PB)

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No. 67

Television for higher technical education of workers

Final report on a pilot project in Poland

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Television for higher technical education of workers

Final report on a pilot project in Poland

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LC nº 72-97943
English edition ISBN 92-3-101089-1
French edition ISBN 92-3-201089-5

Printed in 1973 in the Workshops of the United Nations Educational, Scientific and Cultural Orgnization, Place de Fontenoy, 75700 Paris-France.

Printed in France
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PREFACE

The present report is the outcome of the Pilot Project on the use of television for higher technical education of workers which was carried out by Poland with Unesco's assistance in 1966-1970. The aim of the Project was to up-grade the quality of instruction and to provide wide and equal educational opportunities for all.

The interest in the instructional and educational application of important media such as television is great and widespread. An increasing number of countries - developing as well as developed - have turned to television for the promotion and improvement of the whole system for in and out-of-school education.. Under the circumstances, the experience gained by several countries in this specific field is undoubtedly of great value for the whole international community, especially in the context of life-long education.

For this reason, Unesco published the report on the first stage of the Polish Pilot Project (cf. no. 55 of the series of Reports and Papers on Mass Communication, 1969) and is now publishing the final report covering the whole five-year period of this experiment. This study, like its predecessor, was prepared on the basis of research into sociological, psycho-pedagogical and economic aspects of the Project, conducted by the team of Polish scientists from the Inter-University Centre for Higher Education of the Ministry of Education.

Unesco would like to express its gratitude to the authors of the papers included in this study. The opinions expressed are those of the authors and do not necessarily represent the views of Unesco.

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PART I. OBJECTIVES, OPERATIONS AND COSTS

1. INTRODUCTION

Janusz Tymowski

1. The realization of the right to education proclaimed in the Constitution and the social and economic progress of the country called for a rapid and broad development of education throughout the Polish People's Republic, at all levels but especially at the higher, university level and, at that level, in technical education. Between 1945 and 1970 the number of students attending full-time higher education day courses rose from around 500,000 to around 2,100,000 and, within these totals, the number of students of higher technical schools rose from around 125,000 to 1,250,000. During the same period a system of further education for adults while they were working was developed.

2. The first evening courses for workers were organized in 1948 at the Higher Engineering School in Warsaw by the Association of Polish Mechanical Engineers. In 1950 the courses were taken over by the Ministry of Higher Education and in the next three years similar courses were organized at five more higher engineering schools in large industrial centres. Candidates for evening courses for workers had to have completed secondary education and had to get references from the enterprises in which they were employed. They had to have, too, at least two years' professional experience in the specialization in line with the chosen faculty. Candidates had to pass an entrance examination. Lectures were given four times a week during ten months of the year. Students of evening courses are granted several privileges. They are given full-paid extra leave up to ten days for arranging formalities for admission to studies and taking the entrance examinations and they enjoy full-paid extra leave while attending the lectures. Evening courses have been organized for workers living at or near places where there are higher schools. In spite of some difficulties, very good results were obtained during the first years. A great number of people with solid professional experience were admitted to studies. Among the graduates from these years there was a large number of people who, afterwards, took up high posts. A considerable number of these students did not stop studying after taking the first degree but continued the studies on the second degree.

3. The positive results obtained in these evening courses for workers stimulated further developments. In order to make studies possible for people living far from university centres, extra-mural courses were organized. The main principle of the extra-mural courses is that they are based on one's own work with the help of textbooks. Every month, three-day meetings are organized in the "mother" university for consultations and laboratory training. To decrease travelling to a university and, thus, loss of time, extra-mural courses were organized in most of the technical universities. Rules for admission to extra-mural courses were the same as those for evening courses and there are similar privileges.

4. In the academic year 1960-1961, students of evening courses constituted 7.4% and students of extra-mural courses 16.4% of the total number of students of higher technical courses. But studies for workers were organized in face of difficulties and even opposition. Some university teachers had no confidence in these forms of study, especially extra-mural courses. Enterprises did not understand the situation of employees who wanted to study and gave the leaves prescribed by law unwillingly.

5. Studies for workers impose great mental strain and need great willpower. Students, therefore, have to be selected not only because of abilities but also for personality. The curriculum of the studies for workers provides for a much smaller number of lectures than that for day courses. That is why it is assumed that a great deal of knowledge and special skill must have been acquired by students in the course of their professional work. Many students in courses for workers have acquired a very rich practical experience. They need above all to systematize and complete their knowledge as well as to get theoretical explanations of phenomena known to them. That is why both textbooks and the way of giving lectures and, finally, the type of lecturer should be different from those for day courses. These problems were not sufficiently realized by the organizers of studies for workers.

This is corroborated by the fact that only about 40% of the students of evening courses and 10 - 15% of the students of extra-mural courses graduated.

6. It is necessary to draw attention to the fact that in spite of additional privileges granted to candidates coming from peasant and worker social environments at entrance examinations to the day courses, young people from the intelligentsia are in majority among the students of day courses. But young workers and peasants dominate in numbers the studies for workers, as is seen from the table below.

Students of higher schools by social origin in 1969-1970 (percentages)

	Workers	Peasants	Intelligentsia	Others
Day courses	29.1	15.9	50.5	4.5
Evening courses	57.1	18.5	23.0	1.4
Extra-mural courses	47.1	30.9	19.9	2.1

7. Plans elaborated by the Ministry of Higher Education in 1962 had provided for the rapid development of existing courses for workers and for the organization of new lines of specialization in these courses. Two types of courses were introduced: "master's degree courses" of a rather theoretical character and "vocational courses" which were somewhat shorter and more practical; all the courses for workers were organized as vocational courses. These decisions resulted in a rapid increase of the number of students combining studies with professional work. Whereas in the academic year 1960-1961 54.4 thousand persons out of 165.7 thousand students in total were following evening and extra-mural courses, in 1965-1966 there were 99.5 thousand out of 251.9 thousand, and in 1970-1971 119.4 thousand out of 329.4 thousand.

8. Over the same period, the Ministry of Higher Education took steps to increase the efficiency of studies for workers. In order to decrease the loss of time by students it set up a network of so-called consultation centres, provided with lecture rooms, libraries and consultation staffs. The centres were usually organized in co-operation with enterprises or institutions and local authorities and were run by a higher school serving the area. As a rule, cycles of lectures for students of evening courses were given by teaching staff travelling from the "mother" university. Consultation centres in large population areas were able to secure proper technical facilities and to engage qualified specialists. But the development of these centres met difficulties regarding academic staff, especially for technical studies at centres in industrial towns situated far from the seat of the higher school. As consultants working in these centres were obliged to travel and to work in the evenings and on holidays, top academic staff were unwilling to accept the work. Junior academic staff were engaged and not having sufficient experience could not always assure the proper level of consultations.

9. At the beginning of 1965, on the initiative of the Radio and Television Commission, the Ministry of Higher Education set up a committee to examine the possibility of using television in the higher technical education of students who were working. The problems were also discussed between Polish specialists and officials of Unesco which, as part of its programme, was interested in promoting the use of the media of mass communication for educational purposes and especially for the out-of-school education of adults. Towards the end of 1965 an agreement was made between Unesco and the Polish Government whereby Unesco undertook to assist the Government to carry out an experimental pilot project in using television for the higher technical education of workers, by providing advice, certain equipment and so on, while the Polish Government undertook to carry out research on the project and to make a report to Unesco.

2. GENERAL OUTLINE OF THE "TELEVISION POLYTECHNIC"

Janusz Tymowski

1. The "Television Polytechnic" was conceived as a co-operative effort of the education authorities - the Ministry of Higher Education and the higher schools running courses for workers - and of Polish Television with its local centres. The Minister of Higher Education was to appoint as co-ordinator of their activities a Commissioner for the use of television in higher education and the Chief Editor for Scientific and Educational Programmes of the Polish Television was to be the liaison officer between the Polish Government and Unesco.

2. The central education authorities were to be responsible for determining the needs and for drawing up the general outlines of programmes. The television authorities were to be responsible for the production and transmission of programmes; local editorial units would be charged with preparing and realizing programmes. The education authorities were to organize reception and to prepare textbooks and other auxiliary materials. They were also to be responsible, through universities, for research on the project. On this basis, decisions were taken for the launching of the project by the education authorities regarding the audience envisaged, the material to be covered by television lectures, teaching aids, the organization of reception and the principles and directions of research. The television authorities took decisions regarding the location and general working methods of the programme editorial units including collaboration between them and lecturers in the preparation of the television lectures.

3. Audience envisaged

The telecast lectures were to be aimed at students of the first two years of the higher technical schools for workers. It was considered that specialization of studies at this level and for two years could secure a sufficiently large number of viewers, from 10 to 12 thousands for each year. The viewers aimed at would be students who were working full-time at a job. They would pass entrance examinations for the television courses and matriculate at one of the higher technical schools for workers. It was assumed that, besides students of the higher technical schools for workers, students of courses for workers on agriculture, economics, etc., would be interested in television lectures on subjects, especially mathematics, covered by the curricula of these faculties. It was also thought that students of day courses, pupils of higher classes of secondary schools, secondary school-teachers, engineers and technicians wanting to refresh their knowledge, and people interested in some particular field of science would be interested in some programmes.

4. Range of material to be covered by lectures

The curriculum of the lectures would be based on the curriculum of studies for workers approved by the Ministry of Higher Education. When the project started, the Polish Television was operating on one channel only and could only undertake to diffuse ten 30-minute programmes each week during normal hours. The lectures could be repeated at late hours on the same day after the normal television programme had been ended. Polish Television could, therefore, offer only 85-90 programmes of 30 minutes each in a trimester. The curriculum of evening courses covering the same ground provided for about 240 lectures of 45 minutes each. It was obvious that television lectures could cover neither all the subjects in the curriculum for a given year nor all the material of the subjects on which lectures were given. This called for a very careful selection of topics to be presented in the television lectures.

5. The major part of telecasts for the first year students were to be on mathematics and physics. The lessons were to be those which, according to the academic staff giving lectures in the first year of studies for workers were found difficult to understand. In the first semester of the second year, the television lectures were to be on mathematics and physics, but in the second semester, they were to be on physics, mechanics of materials and electrotechnics.

The following four semester schedule of television lectures was planned:

	First year		Second year	
	1st sem.	2nd sem.	1st sem.	2nd sem.
Mathematics	55	39	54	-
Physics	-	54	36	27
Descriptive geometry	16	-	-	-
Chemistry	16	-	-	-
Mechanics of materials	-	-	-	27
Electrotechnics	-	-	-	36
in total	87	93	90	90

6. Teaching aids for students

To prepare for lectures and to carry on further work afterwards, students must have at their disposal textbooks which enable them to study at their own rate. This is even more important in the case of television lectures when viewers cannot take

notes and even should not try to. It was decided that special information books designed for the viewers of television lectures should be provided as well as usual textbooks. The special information books contained advice on methods of individual work for students following extra-mural courses, as well as the curricula of studies and the programmes and dates of television lectures. The programmes also included references by subject to appropriate chapters in the textbook. All this information was to make it possible for regular viewers to prepare for lectures and for occasional viewers to pick out lectures of special interest to them.

7. The provision of suitable textbooks was to prove difficult. The schools for workers used several different textbooks published in limited numbers. Most of them did not meet the needs of the students because of changes in the curricula and advances in science and technology. In the end, steps were to be taken in collaboration with leading professors to resolve the problem. The subject matter of curricula and lectures were revised, the best textbooks were selected and an impetus was given to issue new ones. These steps created the conditions under which it was possible to place orders with the Central Polish Scientific and Technical Publishers, which met the demand. It was also decided to issue booklets containing the texts of the telecast lectures, and other booklets giving examples of problems referred to in lectures and exercises to be done.

8. Organizing reception

The rôle of the television lectures is different in the case of evening classes and extra-mural courses. For the latter, they are the basic source of information on the most important and difficult parts of the course. Hence extra-mural students must be able to get explanations of material they have not understood, to check their knowledge by doing exercises and to know whether they solved the problems correctly and so on. In the normal system of extra-mural courses such aid is obtainable by students only at monthly meetings; monthly intervals seemed to be too long for telecast courses.

9. Hence it was decided to organize a network of consultation centres properly equipped and with their own staff. The consultation centres were to organize group viewing of the television lectures, consultations and, if necessary, complementary lectures. The best arrangement was to relate the network of centres to the system of higher schools, to place the centres in a given area to the care of competent higher schools. Groups would consist of 25-30 persons and the lectures were watched under the supervision of specialists in the subjects who outlined the main points for 10 minutes before the telecast and afterwards answered questions for 45 minutes. Centres could only be organized in big population areas or at large enterprises. In smaller areas or firms, group viewing was recommended so as, at least, to enable students to discuss the lectures and to do exercises in the booklets immediately after the lectures. It proved possible to obtain help for many small groups from local technical associations.

10. At evening courses in higher technical schools, the telecast lectures could be integrated with the direct lectures. The lecturers could spend less time on parts of the courses covered by telecast lectures or use them as auxiliary material to support direct lectures.

Principles and directions of research

11. In view of the lack of experience in using television for higher education, it was necessary to organize thorough research to find out the best methods of presentation and determine the factors influencing the effectiveness of the lectures. It was also necessary to organize a system of rapid information on reactions to the level and methods of television lecturing by different lecturers. It was thought worth while to investigate the interest and reactions of marginal viewers to whom the lectures were not addressed.

12. The aim of the continuing long-term research was to arrive at objective findings on the following points:

a. social incidence of technical courses for workers;
b. motives of decision to undertake studies while engaged in full-time jobs;
c. assessment of the didactic value of television lectures;
d. effectiveness of television lectures as an aid to students of extra-mural courses for workers.

As for the system of rapid information, it was assumed that it would be based on a network of selected viewers and contacts with enrolled students and on conferences organized every trimester with the heads of consultation centres, television lecturers and academic consultants.

3. OPERATION AND DEVELOPMENT OF THE "TELEVISION POLYTECHNIC" 1966-1971

Janusz Tymowski

1. Organizational structure

The Commissioner for the use of television in higher education appointed by the Minister of Higher Education was assisted by an advisory board of 12 members representing Polish Television, departments of the Ministry and University professors and lecturers conducting courses for workers. His function was to advise on major questions of policy and organization. The Commissioner was also assisted by a Programme Committee of seven members which was responsible for determining the general outlines of the television courses and preparing the plan of telecasts. The Committee also prepared lists of prospective lecturers specialized in different subjects, with the aim of appointing the best specialists who were also experienced teachers. The education authorities, central and local, were responsible for organizing reception on the lines indicated above.

2. The Chief Editorial Office for Scientific and Educational Programmes of Polish Television and, within it, a team for the "Television Polytechnic", was responsible for the planning, production and emission of the television lectures, either centrally in Warsaw or through local editorial and production units at television centres in the important university cities of Wroclaw, Gdansk, and Katowice. The Chief Editorial Unit and the local units besides being responsible for the television producers and technicians engaged the selected academic consultants and lecturers and handled relations between them during the preparation of scripts and actual production. They were also responsible for the preparation of teaching aids.

3. While some organizational changes were made during the course of the project the basic pattern of responsibilities as between the educational authorities, academic staff and television technicians was maintained. A major difficulty affecting collaboration was the temporary lack of equipment for recording lectures. It was impossible to record lectures at the place of the lecturers' work, which resulted in their having to make frequent trips to the studio and to repeat telecast lectures several times. On the other hand, the limited capacity of the television studio excluded Warsaw, which would have been the best centre for physics telecasts, from preparing and transmitting these.

4. The Inter-University Institute for Research on Higher Education undertook research on methodology and effectiveness of television lectures and, for this, formed a special group of pedagogues, psychologists and sociologists.

Trial period, Preparatory Course, February-June 1966

5. It was decided that, in order to prepare the television courses foreseen, it was necessary to organize as from February 1966 a trial course of lectures. Because they would start during the course of the academic year, it was decided that the trial lectures should be on subjects for entrance examinations to the universities. Thus it might be possible to check the effectiveness of the lectures against results of entrance examinations. Four 30-minute telecasts on physics and mathematics a week were scheduled, two to present subjects and two to repeat them. For this, it was necessary to draw up a curriculum of lectures on physics and mathematics, to secure teaching staff, to provide viewers with textbooks and an information book containing the curriculum and time-table of television lectures as well as advice on how to make use of lectures.

6. The questions of curricula and teaching staff were resolved thanks to the helpful attitude of professors asked to collaborate. The question of textbooks was solved by adopting those on physics and mathematics which had been prepared specially for candidates for technical universities and published by Polish Scientific and Technical Publishers. As new editions of the textbooks were being prepared, the publishers were able to provide sufficient copies. All the enrolled viewers were provided with the textbooks by the beginning of February. Scientific and Technical Publishers also issued "The Information Book for Candidates for Higher Technical Schools for Workers" containing information on the rules of admission to courses for workers, the location of different specialized courses, the full scope of knowledge required to pass the examinations, information and advice on the use of telecast lectures, and the detailed time-table for the telecasts. This information book was available as from 8 January 1966. Information about the telecasts was also broadcast after the television news and advertisements were placed in the press.

7. By arrangements with higher technical schools, the Department of Technical Studies of the Ministry of Higher Education organized 15 consultation centres in large enterprises and equipped them with television sets; local technical universities secured the collaboration of consultants. On 10 January 1966, a conference was organized with the participation of vice-rectors of universities running courses for workers and heads of the

15 experimental centres, to discuss the aims of the television lecture course and the rôle of the consultants. The consultants were to be chosen as a rule from the academic staff of the university in the area which gave the lectures for workers.

8. The announcement of the preparatory courses met with a great response. For the planned number of 12,000 students to be admitted to the first year of higher technical studies for workers in the academic year 1966-1967, it was expected that there would be about 30,000 viewers of the television lectures. In fact, over 56,000 persons purchased the Information book at the beginning of January.

9. A first programme was telecast in February 1966. It emphasized that the television lectures covered only a part of the material to be learnt and that watching the television lectures could not take the place of individual work but only facilitate it. Letters addressed to Polish Television had shown that the aim of the television lectures was not always properly understood.

10. The telecasting of the preparatory course started on 15 February 1966 with introductory talks on the work of mechanical and electrical engineers and how viewers could organize their own work. The first lecture on mathematics was telecast from Wroclaw on 22 February and the first lecture on physics on 28 February from Gdansk. These first lectures were carefully watched by the mathematicians and physicists engaged to give lectures. Thereafter, until end June 1966, four lectures were telecast each week, on Tuesdays and Wednesdays from 4.25 to 4.55 p.m. and repeated on the same days after 10 p.m. A first assessment of the television lectures was made at a conference organized on 31 March, with the participation of vice-rectors of all universities running courses for workers, the consultants on mathematics and physics at the experimental consultation centres, members of the research team, and representatives of Polish Television. It confirmed the general assumptions that had been made regarding the television lectures. It confirmed, in particular, that viewers should watch the lectures after working through the appropriate part of the textbook. The consultants were of the opinion that a large part of the viewers were not used to lectures and that, in consequence, the rate of lecturing was too fast for them, which led them to give up watching. Television lecture methods were quite different from those used in secondary schools. This raised questions regarding the level of the lectures on which differing views were expressed at the conference. The research team continued to collect information particularly during the university entrance examinations.

Experimental project, 1966-1967. Courses for first-year students

11. The first series of 30-minute television lectures for first-year students started on 6 September 1966 and ran to the end of the year. 55 lectures were telecast on mathematics, 16 on descriptive geometry, and 16 on chemistry. The lectures were at the rate of five a week on Tuesdays from 4 to 5 p.m. and Sundays from 8.30 to 9.30 and 10 to 10.30 a.m. (The Sunday lectures were found to be inconvenient for viewers and in 1967-1968 all the lectures were telecast on working days). In the second semester, from 5 February to 20 June, 39 lectures on mathematics and 50 lectures on physics were telecast at the same times and 6 further telecasts were devoted to questions put by viewers.

12. Considerable difficulties arose in fixing the dates of particular lectures because of the need to co-ordinate the curriculum of the television lectures with that of the evening courses. This problem had not arisen with the trial preparatory course. Moreover, discussion with the vice-rectors in charge of studies for workers of several higher technical schools showed that these schools were not in a position to find academic staff for all the consultant posts at the same time. Under the previous system of extra-mural courses one specialist, e.g. in mathematics, helped several consultation centres visiting each on a different day of the week. Co-ordinating the television schedule with the evening courses curriculum required as many consultants on mathematics as there were consultation centres served by a given higher school. It was decided that every higher school was to maintain, at least, one consultation centre at which the consultant watched the television lectures with a group of students and afterwards answered students' questions. To meet these conditions the dates of particular television lectures were fixed so that they followed about a week after the corresponding lesson at the evening courses, and on the days when lectures were telecast there were no lectures at the evening courses.

13. The local television editorial offices which had already gained experience were responsible for their technical transmission. The Wroclaw office, which was working all the year, was in charge of the lectures on mathematics. The Gdansk office organized the lectures on descriptive geometry in co-operation with the Gdansk Technical University. For the lectures on chemistry a new office was set up in Katowice and academic staff from the universities of Katowice, Wroclaw and Cracow were engaged to give lectures.

14. The lists of prospective candidates for lecturers were prepared by the Programme Committee as for the preparatory course. The direct talks with selected lecturers were carried out by the local television editorial offices. In the preparatory course of lectures for candidates for studies, the idea had been to engage a large number of lecturers so as to present several ways of approach to the subjects. But for the lectures for students, it was intended that single lecturers should give lectures on integrated themes. The obstacle to

this was the strain involved in preparing a series of lectures and then delivering them.

15. It had been decided that the lectures should be along the lines of the textbooks for courses for workers approved by the Ministry of Higher Education. It was, however, possible to use only those textbooks which could be delivered by the publishers before 15 August. This limited the choice and made it necessary to adopt one textbook from among those already published, in spite of its shortcomings. Engaging outstanding professors to deliver the television lectures led to much discussion of the existing curricula and textbooks. Elimination of shortcomings would be possible in future years when new textbooks were produced. A special information book, similar to that for the preparatory course, was published. As a further step to help viewers, the weekly "Technical Review" published summaries of the television lectures.

16. A conference for the exchange of experience on current work was organized in Cracow on 8 November 1966, in which took part the vice-rectors or their directors of studies for workers, the consultants of the experimental consultation centres, the heads of consultation centres organized by enterprises, and some of the television lecturers. The aim was to assess the effectiveness of the lectures on the basis of opinions expressed by the viewers, and to discuss future work. The basic material for discussion were written opinions prepared by the consultants with the participation of viewers. All those present agreed that the best results were obtained with organized groups viewing the lectures. It was said that the television lectures raised the level of evening courses; they increased the rate of teaching and learning, and facilitated the work of the lecturers as well as of the students. In general, among the lectures given in the first semester for the students of the first year, those on descriptive geometry were most appreciated, while those on chemistry were appreciated least. Consultants and students shared the view that the television lectures were more effective when the students watched them after previously working on the subject. Hence the need for co-ordinating the timetables and the television transmissions. It was also necessary that textbooks should be properly related to the television lectures. Explanations and answers to viewers' questions were most effective when they were given immediately after the lecture. Hence, there should be intervals between lectures. The earlier system of Sunday lectures, when the lectures on descriptive geometry, chemistry and mathematics followed each other, allowed for consultation on the third lecture only. At the same time, it was pointed out that consecutive lectures on mathematics, as happened on Tuesdays, were very exhausting for students.

17. At the end of 1966 the Ministry of Higher Education and the Ministry of Education were integrated. This affected the "Television Polytechnic"; the post of Commissioner and his advisory board were abolished and for some time there was no organ at the Ministry of Education and Higher Schools formally responsible for co-operation with Polish Television. In May 1967, the Presidium of the Chief Committee for Higher Education set up a Committee for Technical Means of Education. That Committee, in turn, set up a group for co-operation with Polish Television, the chairman of which exercised the functions of the former Commissioner, but with less responsibilities.

Experimental project, 1967-1968. Courses for first and second year students

18. In 1967-1968, television courses were given in parallel for both the first and second years of studies. The programme for the first year included 54 lectures on mathematics, 17 lectures on descriptive geometry and 17 lectures on chemistry in the first semester, and 40 lectures on mathematics and 54 lectures on physics in the second semester.

19. The programme for second year studies at evening courses for workers specializing in general engineering comprised 5 lectures on mathematics, 2 on physics and 3 on mechanics each week during the first semester of the second year and during the second semester one lecture on physics, 2 on mechanics of materials and 2 on electrotechnics. The Commissioner's Programme Committee, still functioning at the time, after analysing the curricula of the evening courses and of the proposed television lectures decided to drop television lectures on mechanics and, given the limited time available for transmissions, proposed 3 lectures on mathematics a week, 54 in all, and 2 lectures on physics a week, 36 in all. This was for the first semester of the second year. The programme for the second semester was: 1 1/2 lecture on physics a week, 27 in all, 1 1/2 lecture on mechanics of materials a week, 27 in all, and 2 on electrotechnics a week, 36 in all. Since the television lectures could not cover the whole curriculum in mechanics of materials and electrotechnics, it was agreed that the television lectures should cover only those parts of the course which were common to all specialized studies.

20. The pre-recording of television lectures was initiated. This required great efforts but led to a marked rise in the level of the lectures. Pre-recording eliminated shortcomings unavoidable in direct transmissions. More important, it saved lecturers the necessity of trips to the studio and hence made it possible to engage as lecturers leading professors and others who were too busy to travel to the centres from which the lectures were telecast. It was also to make possible repeating lectures and thus reduce costs.

21. To meet the objections to Sunday lectures the telecasts were scheduled for Tuesdays 4 to 5 p.m. and Mondays and Fridays 3.45 to 4.15 p.m. and 4.25 to 4.55 p.m. At first, it was intended to give one lecture for first-year students and one for

second-year students each day so as not to give viewers too much to absorb. Moreover, the consultants would be able to discuss questions with the viewers and to do exercises immediately after the lectures. However, because of travelling difficulties for the consultants and the considerable loss of time in relation to the time of consultations, it was necessary to abandon the idea and to organize for each day 2 lectures on the same subject and for the same year of studies. Only the lectures on descriptive geometry and chemistry were telecast at the rate of one lecture a week.

22. The number of television lectures on physics was now to correspond to the number of lectures foreseen in the evening courses for workers. For this reason it was intended for 1967-1968 to replace auditorium lectures for some students of evening courses by the television lectures which would be viewed in groups with the help of specialized consultants to answer questions. The operation was to be the object of careful research and in the event of positive conclusions, the television lectures were to replace the auditorium lectures on physics.

23. As Professor H. Jablonski, Minister of Education and Higher Schools, said in his television speech inaugurating the television lectures for 1967-1968 it would be possible in the future for television lectures to cover all the courses for the first year so that candidates could be admitted directly to second year studies, after an entrance examination covering the curriculum of the television lectures. But to carry this into effect it would be necessary to fulfil the following conditions:

a. television lectures would also have to cover the teaching of foreign languages and political economy (although the lectures on political economy could be broadcast by radio);
b. the number of television lectures would have to be increased by 4 a week in the first semester and by 2 in the second, exclusive of the foreign language teaching;
c. laboratory training would have to be available for the students at the laboratories of grammar and vocational secondary schools.

The advantages for the student would be that he could adjust the rate of his work to the time available to him and thus, for instance, study the material for the first year of studies during two years.

24. It was also considered that telecasting lectures for candidates for admission to higher technical schools should be resumed when Polish Television operates a second channel.

25. On 16 February 1968, the Department of Technical Studies of the Ministry of Education and Higher Schools organized at Cracow a meeting of the consultants, the television lecturers, representatives of the Centre for Research on Methodology of Studies for Workers in Gliwice, vice-rectors of the higher schools for workers and representatives of the Chief Editorial Office for Scientific and Educational Programmes of the Polish Television. The main question discussed was how to assess and arrive at the right level of studies for workers. This and the assessment of the standard of education of candidates are always very difficult.

26. A comparatively objective measure of standard of education of graduates from secondary schools is provided by results obtained at entrance examinations to the university. There is no similar measure for graduates from universities; their study programmes are drawn-up by groups of specialists and the criteria applied to the university final examination are fixed by the universities themselves. An assessment of graduate education might be based on the usefulness of young graduate engineers in enterprises to which they go to work. But such assessments would depend on the qualifications of the persons giving opinions and their competence in introducing young engineers to the work and in using them properly as engineers. The requirements made of students of courses for workers by the higher technical schools and the enterprises were low. Due to the number of vacant places in the higher schools, lesser demands were made of the candidates, and people whose professional work was not in line with specialization of a chosen faculty were admitted. Graduates from the higher technical schools for workers also found themselves usually still employed in the same positions in their enterprises. Their degrees were taken only as certification of actual status; the abilities of the worker studying were known in the enterprise and his graduation did not lead to great changes.

27. The introduction of the television lectures brought some changes to this situation. Leading academic staff was engaged for the lectures. Curricula and textbooks were examined and modified to fit the worker-students for whom the television lectures were intended. The discussions at the conference on 16 February showed that in a considerable number of the higher schools running courses for workers, the lectures covered only 60% to 70% of the prescribed courses in mathematics and physics. This was the result mainly of the insufficient education of the students, and, partly, of the insufficient ability of the lecturers. The direct lecturer repeats the lecture or parts of it when he finds that the students are not following or do not understand, and this takes considerably more time than is provided for. On the other hand, since the television lectures preceded the direct lectures at evening courses and were thus the first presentation of the subject, they were not understood by a large part of the students who were not prepared for them and could not use the textbooks available because they were not in line with the curriculum of the television lectures. The efforts to provide adequate consultation facilities for viewers had not proved sufficient. The number of viewers organized in groups formed a small percentage of the students of the first year courses for workers.

A basic problem for all viewers or potential viewers was the time of the telecast. Four o'clock p. m. was too early and repeating lectures after 10 was too late. Unfortunately, that problem could not be solved while Polish Television operated one channel only.

Experimental Project, 1968-1969. Introduction of "zero-course" to prepare candidates for further studies

28. For 1968-1969 it was decided to concentrate the activities of the "Television Polytechnic" on preparing candidates for admission to further studies and to organize for them a so-called "zero-course". While lectures for the first year of studies were maintained lectures for the second year were stopped. The "zero-course" for candidates comprised 80 lectures in mathematics and 80 in physics covering the secondary school curricula in these subjects; they were telecast from 3.30 p. m. The potential audience for this preparatory course was much wider than that for the previous courses given by "Television Polytechnic". Entrance examinations in mathematics are obligatory in most faculties. For graduates from secondary vocational schools in which the course on physics ends with the second or third class, television lectures on this subject would be specially helpful. The lectures of the preparatory course could be of special importance for the pupils of country schools. They provided a means of raising and levelling-up standards of education between rural and industrial areas and between small towns and large cities.

29. From 9 to 16 September 1968, the Polish Government, in co-operation with Unesco, organized a European Conference on the use of television for higher education in Warsaw, in which specialists from 14 countries took part. The representatives of Poland presented five reports on the basis of the work of the "Television Polytechnic".

30. In 1968, the Ministry of Education and Higher Schools issued regulations providing that candidates for studies prepared on the basis of television lectures given for the first year of studies could take the entrance examinations directly to the second year of courses for workers. To help candidates to prepare for the examinations, the Centre for Research on Methodology of Studies for Workers in Gliwice prepared a special information-book containing the programmes for the first year of studies, titles of prescribed additional textbooks and examples of examination themes. The actual results were poor. During two years, about 800 persons sat for the first examination in mathematics, but only 100 persons passed all the examinations necessary to start the studies on the second year. A large number of candidates who sat for the first examination supposed that the new arrangements meant a reduction in standards required and they were not properly prepared. It should be, however, mentioned that the candidates applying under the new arrangements had not had the continuing help of consultants and had been obliged to rely exclusively on themselves.

Experimental Project 1969-1970. Introduction of lectures for secondary school teachers

31. At the end of 1969 the term of office of the Chief Committee for Higher Education expired, and the Committee for Technical Means of Education, and with it its group for co-operation with Polish Television, ceased activities. Most of the consultation centres where television lectures were viewed by groups also stopped functioning. Production and transmission activities were still maintained by the television editorial offices. Research, though on a limited scale, was continued by the Inter-University Institute for Research on Higher Education.

32. In these circumstances, in the academic year 1969-1970, the range of programmes remained basically unchanged, i.e. lectures for the first year of studies and for the preparatory course were telecast. But, a course of 40 lectures on mathematics for secondary school teachers was organized on the initiative of the Department of the University Studies of the Ministry of Education and Higher Schools. This course was designed to meet problems arising from the introduction of new programmes in mathematics to secondary schools.

33. The situation regarding the time of telecasting the lectures became worse. The times were now 2.25 - 2.55 p. m. and 3.00 - 3.30 p. m. with repeats after 11.00 p. m. The number of working people who could watch lectures at these times was very small. For viewers watching lectures of the preparatory course, the majority of whom were the pupils of final classes of secondary schools, the situation was far better.

Experimental Project, 1970-1971. New Prospects

34. During the year 1970-1971, lectures were usually telecast at 3.20 - 3.50 and 3.55 - 4.25 p. m., but sometimes earlier, e.g. 2.55 p. m., or only at late evening hours. Lectures were repeated as in the previous year, usually at 11 p. m. or sometimes even after 12 p. m. The programmes continued unchanged. But in view of the approval by the secondary school teachers of the lectures on mathematics, a course of 20 lectures on physics was started in February 1971.

35. In October 1970, Polish Television started programmes on a second chain which, at the beginning, could be received only in Warsaw, Katowice, Cracow and Lódz. This did not, however, affect telecasting lectures for higher technical schools; the Ministry of Education and Higher Schools had not put forward any claims for the programme. But prospects for improvement appeared towards the end of the academic year 1970-1971. After

long preparatory work the Inter-Ministry Committee for Teaching through Television under the leadership of the Vice-Minister of Education and Higher Schools was set up. At its first meeting on 23 March 1971, the Committee established a programme which provided for considerable development of the system of teaching at the university level by means of television. The programme called for development of the experiment of admitting candidates directly to the second year of studies. On 25-26 March, a conference was organized by the Inter-University Institute for Research on Higher Education to discuss the problems of the use of television in higher education. Its aims were to:

1. collect information on previous Polish achievements in the field;
2. compare those achievements with world trends;
3. arrive at conclusions and to present proposals and suggestions to the Ministry of Education and Higher Schools.

Seventy-six persons took part in the conference, among them the Vice-Minister of Education and Higher Schools and heads of Departments of the Ministry. Representatives of higher schools formed the largest group, 44 persons including 9 representatives of military higher schools. Polish Television was represented by 9 persons and the local television centres dealing with television lectures sent representatives. Lecturers of the "Television Polytechnic" and lecturers giving lectures on mathematics and physics for teachers also took part in the conference.

36. The possibilities and actual utilization of television for higher education were analysed. The following conclusions were arrived at by the conference.

1. Television justified its existence only when it is working on the basis of general didactic principles, no matter whether it is the nation-wide television system or the closed-circuit television. Effective results can be obtained only when the television lectures are complemented by special textbooks, by the work of consultation centres and by prompt research on needs of the television audience.
2. To improve the operations of the "Television Polytechnic", it is necessary, first of all, to change the time of telecasting the lectures, to revive the activities of the consultation centres and to increase the number of publications accompanying the television lectures.
3. All operations in the use of television in higher education should be based on active research on standards of television pedagogy, and the results and trends of this form of teaching.

4. THE ROLE OF THE "TELEVISION POLYTECHNIC" IN POPULARIZING SCIENCE

Janusz Tymowski

1. Research on the impact of the television lectures was carried out from 1966 to 1968 by the Public Opinion Research Centre of the Radio and Television Commission. The research proved that the number of viewers was several times greater than the number for whom the lectures were intended. Investigations in 1967 proved that the lectures were watched by people from 14 to 70 years old and from widely different educational, social and professional environments. In 1968 research was carried out on the basis of a sample of 1,500 persons who owned television sets. Results indicated that about 3.5% of all viewers watched the lectures, i.e. about 270,000 people. The education of the viewers was as follows: primary education 22%; not completed secondary education 27%; secondary education 37%; not completed higher education 6% and higher education 8%. The telecasting of the lectures of preparatory course for candidates for higher schools from 1968 onwards resulted, no doubt, in increasing the number of viewers in the first three groups; if so, the number of viewers watching the lectures with different frequency might be estimated at about 500,000. Of this number about 100,000 are viewers for whom the lectures are a direct help in studies and in preparing for examinations; the rest watch the lectures out of intellectual interest.

2. This is of great importance because it could lead to an increase in the percentage of young people taking up scientific and technical studies and to a change of attitude of adults toward scientific and technological change. Only a small percentage of pupils are interested in the extraordinary achievements of science and technology. The reason is the lack of good teachers in secondary schools. The school laboratories are equipped poorly, especially those in the country, and there is no possibility of carrying out experiments to present phenomena and to encourage them to experiment on their own. No doubt also, the fact that scientific studies require more time than humanist studies inclines young people to opt for the latter.

3. The lectures of the "Television Polytechnic" are given by eminent specialists who are good pedagogues and who have access to facilities not normally available even to well equipped schools. They can present experiments in such a way that every viewer can observe details. They can make use of film clips to present the practical applications of scientific principles described during lectures.

4. The lectures on the fundamentals of mathematics, physics and chemistry met the demands of those who had not received a scientific education or only an inadequate one at school. In this respect, the lectures for the second year of studies were very useful; they were stopped temporarily to enable telecasting of the preparatory course. In reply to the questionnaires prepared by the Centre such answers as the following were often made: "I watch the lectures on electrotechnics only in which I am passionately interested", "I watch the lectures on chemistry, which for me is like a hobby", "I watch the lectures so as not to fall behind in my knowledge of science". In present conditions of rapid changes in every field, prompt and reliable information on new achievements and new applications of these achievements are very important especially for people who exercise technical professions. Hence, it is necessary to refresh knowledge of the principles behind processes. The opinions of engineers and technicians watching lectures, as well as individuals answering the questionnaires indicated that television lectures served this purpose. Typical answers were: "The lectures refresh the knowledge necessary for me in my profession"; "They help me to improve my professional qualifications and to refresh knowledge acquired from books"; "I watch the lectures in order to recall things: this is better than searching through textbooks"; "I am an electrical engineer and I am interested in mathematics, physics and chemistry. The lectures give a lot of information on subjects of interest to me, which is very useful in my professional work". The television lectures have also helped to raise the standard of work of secondary school teachers. They present model ways of giving lectures and of using teaching aids.

5. PEDAGOGICAL PROBLEMS OF THE "TELEVISION POLYTECHNIC"

Jerzy Zakrzewski

1. The "Television Polytechnic" project faced the educational and television authorities with many pedagogical problems. No one doubts that television is an important medium of mass communication, and of education. At the same time, it has its limitations. The advantages of using television for conveying scientific information are obvious. Television can reach mass audiences in the most impressive and popular ways through image and sound. It can convey information of an abstract character, which can be presented on the screen in the form of signs and symbols. Thus mathematics, physics, chemistry, and descriptive geometry, can be presented in visual terms. In addition, by television, it is possible to present in concrete form the application of science to contemporary processes and situations. The basic limitation of television as a teaching medium is the absence of the traditional direct contact between teacher and pupil. In television teaching the lecturer is completely cut off from the pupils. He is talking to an audience which he cannot see or in any way control. He cannot adapt his style to the nature, mood or reactions of those listening to him. He has no opportunity of questioning them and exchanging views with them. The very techniques of television transmission and reception, for example, the shape and size of the screen also affect the methodology of television lectures.

2. The general pedagogical questions concerned the scope of television studies and their rôle in the higher education system, curricula and choice of subjects and topics, and the relationship of television lectures to other new methods of teaching. As for methodology, it was clear that it was necessary to work out new approaches for television lectures. Finally, there was the question of the didactic effectiveness of television lectures: did the results obtained with viewers of the "Television Polytechnic" justify its creation? The specifically pedagogical and didactic questions were the object of combined efforts on the part of the Ministry of Education and Higher Schools, Polish Television, and the academic staff committed to working for the "Television Polytechnic". Research on effectiveness and results of the operation was carried out by the Inter-University Institute for Research on Higher Education by decision of the Ministry of Education and Higher Schools.

3. The following attempt to present the didactic achievements of the "Television Polytechnic" is a continuation of previous publications on teaching through television based on this experiment. The basis for the supplementary conclusions which follow was the research on the "Television Polytechnic" carried out by the Inter-University Institute for Research on Higher Education in 1968-1970(1) and the conclusions of the conference on the use of television in higher education, organized by this same Institute on 25-26 March 1971.

General pedagogical problems

4. There can be two systems for the use of television for higher education which can be expressed as: higher schools and television and television and higher schools. In the first case, television plays the auxiliary rôle and is used to help the higher schools in teaching curricula designed for and by them. In the second case, curricula are devised in the context and terms of television which exercises the primary teaching function. The "Television Polytechnic" was based on the first approach; the English Open University is probably the example of the second approach. The "Television Polytechnic" functions within the general technical education system and carries out defined tasks with varying degrees of independence. Thus, for instance, the preparatory course for candidates for technical studies was, in the main, a self-contained operation but the aim of the course was a rather modest one. On the other hand, the lecture courses for the first and second year of studies for workers were designed to complement the activity of the higher technical schools and to meet the needs of students in evening classes or following extra-mural courses. For the latter the lectures provided basic instruction on the prescribed curriculum. For many of them who were preparing for the extra-mural examinations to the second year of studies the television lectures were the only channel of organized instruction.

5. Teaching through television cannot be limited to the telecasting of lectures. Their effectiveness is dependent on the creation of an efficient teaching system of which the components, in the case of the "Television Polytechnic", are:

a. provision of teaching aids: especially prepared textbooks, prospectuses of television lectures, etc.;
b. creation of consultation centres to perform the following tasks:
   organization of systematic collective viewing by groups,
   provision, through consultants, of assistance to students in their studies through discussion and further explanation of difficult subjects;
c. organization of research and means of obtaining opinions from students and teaching staff, so as to provide lecturers with information about the teaching value of the lectures and the needs of viewers.

1. Detailed information about this research is given in Part II of the present publication.

6. The closing down of the consultation centres had bad effects on the operations of the "Television Polytechnic". In these centres viewers could watch the lectures together with other students and could get help from the consultants. Moreover, when they closed down lecturers could no longer make direct or indirect contacts with the viewers. The centres should be re-established. The problem is whether to organize a wide network of consultation centres and to locate them in enterprises, or to limit their number but to equip them better and to engage highly-qualified specialists for them. The second seems to be the better solution.

7. In order to obtain opinions on the television lectures and to assist research, groups of viewers were formed. But attempts made to give lecturers current information on viewers' reactions failed. Given the lengthy production process, data concerning reaction to lectures reaching the lecturers through the publications of the Inter-Universal Institute for Research reached them too late to be useful. Reviews of lectures prepared by teachers and sent directly to the lecturers immediately after the lectures were welcomed by them but could not, however, satisfy them because they were haphazard. In the light of the findings of organized research it seems that supplying current information on viewers' impressions is not of substantial importance, although the lecturers say that such information is helpful to them. All lecturers, even experienced ones, should receive systematic information on the opinions and needs of viewers to help them adapt their lectures to their invisible audiences and to check the effectiveness of new methods and techniques of presentation. This calls for systems and institutions to provide this information. One initiative was the establishment of continuing means of exchanging experience between lecturers through seminars organized in the television educational centres under the direction of experienced higher schools and scientific institutions.

Methodology of television lectures

8. Research results have shown that effective teaching methods have been worked out for television lectures. It is to be noted that the assessment by the lecturers themselves of their teaching ability and skill led to positive results. Thus, in the course of research carried out in 1966, some 23% of viewers of the preparatory course interviewed said that the rate of the lecture was too fast; in 1968-1970 such statements were rare. This indicates that the lecturers responded quickly to the feelings and needs of the students.

9. Television lectures are marked by several new features as compared with traditional lectures given directly in front of the students. Since they are addressed to mass audiences of inequal standards of education and because the costs of preparing and telecasting programmes are very high, the quality of the lecture must be an object of special concern. Those who have decided to watch the television lectures pay special attention to all details and notice faults that would not be noticed in direct lectures. It seems that viewers expect that the television lectures should be characterized by:

a. concrete and substantive approach treatment of subjects and close co-ordination with the curriculum of studies in technical higher schools;
b. large use of visual material showing experiments and examples of practical application of principles;
c. simple and clear methods of presentation, and not too fast.

10. Television lectures are prepared by a team including, in addition to the lecturer, an assistant, to present the experiments, technical staff responsible for illustrative material and cameramen. It is the lecturer's task to define the topic and character of the lecture. Since the "Television Polytechnic", lectures are considered to supplement studies for workers there seems to be no reason for them to be simply informational and descriptive. Any good textbook can do this. The experience of the "Television Polytechnic" shows that lectures of a synthetic character, covering more difficult problems of the systematization of knowledge, are the most appreciated. The television lecture should encourage or even force viewers to undertake individual work with textbooks. The lecturer defines the content and character of each 30-minute lecture. He must decide whether to discuss many problems at the cost of exact explanation or to explain a few problems in detail. Research on the "Television Polytechnic" has shown that the second solution is the better. The preparation of each television lecture needs much more effort than is needed for a direct lecture. The use of every minute of the telecast must be carefully designed. For example, only those film clips which give a maximum amount of directly relevant illustration in a short-time should be used. The lecture must not be overloaded with visual illustrations which distract the viewers' attention. The analysis of viewers' opinions shows that a too rapid rate of lecturing results in loss of attention. Hence, it is necessary to avoid problems that need long explanations and calculations which must be rapidly presented within the limits of a 30-minute lecture. Finally, television lecturers must take account of the specificities of the television screen itself and make the optimum use of it.

11. While the methodology of a television lecture does not differ from that of a traditional lecture it is delivered in physical conditions that are difficult for many lecturers. The lecturer does not give the lecture in a room full of students but to the camera only and he must identify the camera and space behind it with the audience. As not every lecturer can adapt himself easily to such conditions it is sometimes recommended to invite a group of students to the studio to create in that way a miniature auditorium. The work of lecturer in front of television cameras is exhausting because he must

respect minute by minute the script that has been written for the telecast. He must give the lectures at a proper free rate, neither slowly nor too quickly so as not to cause viewers to lose the thread of the lecture. And he must pay special attention to correct grammar and pronunciation.

The didactic effectiveness of the "Television Polytechnic"

12. While the high level and quality of the television lectures is unquestioned, the didactic effectiveness of the "Television Polytechnic" is still a matter of controversy. The results of research carried out did not give clear information on the matter. In a paper published by the Inter-University Institute for Research on Higher Education - Research on the Preparatory Course - 1969, Mr. F. Bielecki wrote: "On the basis of fragmentary research results, it could be assumed that people who systematically watched the television lectures and were properly prepared to watch them would be more efficient in studies than others. Such inter-dependence was found in the course of the research on the preparatory course". Further research, however, did not confirm this. Full information regarding research on this point is given in Part II of this document. From these chapters it may be understood that, on the average, people who watched the television lectures for the first and second year studies were seldom more successful than others in their studies, and that viewers who took examinations for admission to extra-mural studies were not especially successful. In 1967-1970 only 80 out of 576 such viewers were admitted to the second year of studies.

13. The question then is whether these facts can be the basis for concluding that teaching through television is relatively ineffective. It seems that such a conclusion would not be well founded. It cannot be assumed that the effectiveness and usefulness of television teaching is to be measured by results obtained by viewers. It is doubtful whether it is possible to compare the results of students who watch the lectures with those of students who do not watch them if other conditions and circumstances are quite different. Television lectures as an aid to studies for workers could not be a decisive factor. Thus it was shown that the television lectures were mostly watched by students of courses for workers who were elderly, who lived a considerable distance from a higher school and met with difficulties in the enterprises in which they were employed. Research showed that the lectures were, without doubt, of real help and use to worker students study-in bad conditions. For many students the television lectures were the only form of contact with higher schools thanks to which they could study by themselves.

14. If it can be shown that the results achieved by "Television Polytechnic" are, in general, satisfactory this does not mean that the operation could not be conducted more effectively. Action seems to be called for in the following areas and directions:

A. Regarding the general system:

(i) real co-ordination of the operations the "Television Polytechnic" with organized courses of study for workers;
(ii) synchronization of the schedule for the curricula for workers with those of the "Television Polytechnic",
(iii) improvement of the total system of television teaching and its components: lectures, teaching aids and consultation centre,
(iv) establishment of defined methods for selecting and training television lecturers and television production teams.

B. Regarding the methodology of television lectures:

(i) elaboration of better criteria for the choice, in a given subject, of the content of television lectures,
(ii) provision to lecturers of valid current information on viewers' reactions to the lectures and on their needs,
(iii) elaboration of the best principles for the preparation and presentation of television lectures,
(iv) establishment of reliable methods for assessing the effectiveness of television teaching.

6. ANALYSIS OF COSTS OF THE "TELEVISION POLYTECHNIC"

Tadeusz Przeciszewski - Adam Jakimiak

1. Keeping full and accurate accounts of expenditure on an educational activity such as the "Television Polytechnic" is necessary for two important tasks:

(a) Drawing-up standards of expenditure needed for making plans and estimates for the future,
(b) Comparative analysis of costs of traditional teaching methods and television teaching. This is of special importance for countries in which higher education is at the initial stage and can be useful in planning investments for higher education in developed countries.

2. Fully reliable, deep, analysis of the costs of the "Television Polytechnic" was not possible, due to lack of full data concerning investment and overhead expenditure, and gaps in records of running expenses, of the number of lectures given and of the number of viewers. This paper is based on incomplete data available from the Radio and Television Commission and on the quite rich experience gained by the higher technical schools in costing teaching in the normal system. In the latter case, the data considered covers the total costs of technical universities and higher engineering schools in Poland. This experience will be used in making comparisons of costs and in relation to methods of calculating various levels of cost of higher education activities.

3. The direct costs of the "Television Polytechnic" for the years 1966-1969 by items of expenditure are given in the Table 1 (this and other information is based on work by Z. Burakowski). It may be recalled that in 1966 a first preparatory course was given. This was followed, in the academic year 1966-1967 by lectures for the first year of studies. In 1967-1968 there were lectures for the first and second years of studies and for a preparatory course.

4. A major difficulty in preparing a statement on the cost of the "Television Polytechnic" was the lack of precise definition of what should be included in the cost of one hour of programme emission. If the lectures were given during normal telecasting hours there would be no additional costs involved in telecasting them to be charged against them. But since the lectures have, till now, been given at times when, otherwise the air would have been silent, these emission costs must be taken into account. For several years discussions have been going on between the Ministry of Education and Higher Schools and the Polish Television on changing the emission times so as to telecast the lectures at times more convenient for viewers and changes will probably take place in the future. Nevertheless, for the present, it is necessary to take two elements into account: the costs involved in telecasting lectures outside normal emission hours and overhead charges which also apply to programmes telecast during normal emission hours. Following data supplied by the Radio and Television Commission, the following additional costs of telecasting the lectures can be accepted: add 58.3% of direct costs for cost of special emission hours and 19.3% of direct costs as overhead charges. Figures for the additional or indirect costs of the "Television Polytechnic" during the period 1966-1969 are given in Table 2. Total costs are given in Table 3.

5. The next step was, on the basis of the total hours of emission, to calculate the number of lecture units telecast during each lecture cycle for one year. The number of emission hours registered by the Radio and Television Commission was converted into lecture units on the assumption that a television lecture, corresponding to a 45-minute classroom lecture, lasted about 30 minutes. Using the lecture unit instead of time as the measure makes it possible to make a comparative analysis of costs of the "Television Polytechnic" and higher technical schools. A distinction was also made between so-called first performance lectures involving all the costs normally borne in connexion with the preparation and delivery of a television lecture and repeat lectures which involve only some of those costs. The results of these calculations are given in Table 4.

6. On the basis of these calculations/or estimates of total expenses and of the number of lecture units it is possible to pass to the second stage of investigation, which is the analysis of different unit costs. The first question was to find out how much the average television lecture costs without taking into account the different cycles, preparatory course, first year and second year studies. On the basis of the following indices the average costs are given for 1966 to 1969 in Table 5.

K.1 ratio of direct costs to number of first performance lectures,
K.2 ratio of direct costs to total number of first performance lectures and repeat lectures,
K.3 ratio of total costs to number of first performance lectures,
K.4 ratio of total costs to total number of first performance lectures and repeat lectures.

7. While the figures given in Table 5 can be useful for planning they do not show exactly how much each first performance or repeat lecture really cost. The estimate of direct costs for an average lecture plus repeat, accepted by the Radio and Television Commission, is now around 6,000 zł, of which 700 zł is considered as the cost of the repeat lecture. It can be said, therefore, that the cost of a repeat lecture is approximately 1/8th of the cost of a first performance lecture.

8. Table 6 presents the direct cost of a first lecture, for a repeat lecture, and for a first lecture plus a repeat. However, since the lectures were telecast out of normal telecast hours, it is necessary to add indirectcosts as well as overhead charges. It is difficult to allocate these costs between first performance lectures and repeat lectures. However, the attempt has been made and Table 7 gives the estimated total costs for a first lecture, for a repeat, and for a first plus repeat lecture. On the basis of these figures it is possible to calculate the costs of the different lecture cycles of the "Television Polytechnic" assuming that the costs of a lecture for the preparatory course are the same as those for the first and second year of studies. These figures are given in Table 8.

9. Calculation of the cost per viewer of the "Television Polytechnic" lectures can be based on (a) potential viewers (b) actual viewers and (c) systematic viewers. The potential viewing audience comprises the total number of candidates for technical higher schools and students at those schools, all of whom could be helped in their studies by the television lectures. Figuresfor these, based on the Ministry's statistical year books are given in Table 9. Calculations of average cost per potential viewer were made (a) for candidates for technical higher schools and (b) for students of first year and second year of studies. These costs were calculated on the following assumptions:

(a) the number of students in an academic year was related to the cost borne in the budget year during which the greater part of the academic year fell; for instance, the number of students in the academic year 1967-1968 was related to the costs borne in 1968.
(b) The costs of the preparatory - so-called zero - course in different years were divided by the number of candidates for the technical higher schools in the given year.
(c) The costs of lectures for first year studies were divided by the number of students starting first year studies in higher technical schools in the given year.
(d) The costs of lectures for second year studies were divided by the number of second year students for the same period.

The average total cost per potential viewer-candidate and student are given in Table 10.

10. For the calculation of the cost per actual viewer the total number of these was arrived at in the following way. It was assumed, as a starting point, that the social and professional groups interested in the television lectures were the teachers at grammar and secondary vocational schools who teach subjects on which the lectures of the "Television Polytechnic" were given, students of day technical courses and of science faculties of universities, pupils of the final two classes in grammar and secondary vocational schools, academic staff of higher technical schools and technicians and engineers. The size of these groups was estimated at 585,000. An investigation by questionnaire was carried out among 1,300 persons chosen as a sample representation of these social and professional groups. On the basis of the results of this investigation estimates were made of the numbers of actual viewers. These figures are given in Table 11. The calculated average total cost per actual viewer for different courses are given in Table 12.

11. Further calculations were made for so-called systematic viewers, i.e. groups within the estimated total of actual viewers who would be most interested in the lectures. The estimated numbers of such viewers and the average cost for courses per viewer are given in Tables 13 and 14.

12. A summary of the different unit costs explained in paragraphs 9 to 11 is presented in Table 15.

13. Finally, an attempt has been made to compare the costs of teaching through the "Television Polytechnic" with those of higher technical schools. This has been done by comparing, for the year 1967, the average total cost of the "Television Polytechnic" per one potential viewer and the average yearly cost of the education of one student of the higher technical schools. The total number of potential viewers is taken to be the same as the total number of candidates for studies and of first and second year students as explained in paragraph 9 above. Data concerning costs of higher technical schools were drawn from results of investigations carried out by the Inter-University Institute for Research on Higher Education. The figures resulting from this comparison are given in Table 16. The comparison has also been made of the relationship of the total unit cost of television courses for candidates for studies, students of the first and the second year, and the total cost of education of one graduate from the higher technical schools. The data used were for 1967, except for the preparatory course for candidates, where data for 1969 were used. The results are given in Table 17.

14. These analyses do not provide a basis for assessing whether the costs of the "Television Polytechnic" are too low or too high, nor for drawing final conclusions on the operation. Such assessments can only be made on the basis of a comparison of costs with the results of the "Television Polytechnic" activity or with the costs of a higher technical school taken as a model. It is difficult to assess the results of the "Television Polytechnic" operation as it is of educational activities in general. It is possible, however, to estimate the answer to the question by what degree the effectiveness of education was increased thanks to the television lectures. In spite of the limited amount of information available an attempt has been made to define at what number of viewers television lectures are more economical than traditional classroom lectures. This has only been attempted for the extra-mural courses because they are most comparable with television instruction. The average cost of education of a student of extra-mural courses of

technical higher schools in 1967, excluding amortization costs, was 4,522 zlotys (see Table 16). In the same year the direct expenses for television lectures designed for students of the first year of studies were 3,471,754 zlotys and the total expenses - 6,165,816 zlotys (see Table 8). If it is assumed that the extra-mural courses were transformed into extra-mural television courses and no additional costs were involved, this change would pay economically, at the level of 768 students, assuming that all the lectures were telecast at normal telecasting hours and at the level of 1,364 students if, as at present, the lectures were telecast outside normal hours. The premises are not quite correct because costs would, in fact, rise because of expenditure for television consultation centres and examinations. The economic validity of television lectures can be considered from another point of view. The average cost of education of one graduate from the extra-mural courses of higher technical schools in 1967 was 39,396 zlotys (see Table 17), and the number of lectures within the whole curriculum was 1,383. Therefore the cost of one lecture in the extra-mural courses for one graduate was 28 zlotys. Even if it is assumed that the cost of one television lecture is equal to the average cost of the first performance lecture plus the cost of the repeat lecture then, on the basis of the same assumptions regarding the hours at which the lectures are telecast, television extra-mural courses, in terms of 1967 figures would pay at the level of 644 (direct costs only) and 1,212 students (total costs).(1) The costs of education in extra-mural courses rise every year and it can be, therefore, assumed that the costs of one lecture in the extra-mural courses for one graduate were not greater in 1969 than in 1967. If the cost of television lectures in 1969 is compared with the cost in 1967 of ordinary extra-mural lectures television lectures would pay at the levels of 347 and 620 students.(2)

15. These calculations and estimates indicate that lectures given through the "Television Polytechnic" could already replace the system of extra-mural courses at the level of 347 students, assuming that they were telecast at normal times and would not involve the additional costs, or of 620 students, under the present more expensive system of telecasting. The numbers of viewers should, in fact, be somewhat higher, say 400 to 500 and 800 to 1,000 to take account of increased costs due to additional expenditure on consultation centres and examinations. Since it is difficult to compare costs calculated in the currencies of different countries, the above data concerning the "Television Polytechnic" can only be considered as giving approximate indications of the rentability of television lectures. Because of the degree of specialization in later years of study, it is possible to telecast lectures only for the first and second year of studies and for the preparatory course. It is worthwhile mentioning, however, that under Polish conditions where the total number of the students of one year of extra-mural courses in higher technical schools was about 5,000 persons in 1969, the assumed required minimal number of television lecture viewers of 500 would constitute 10% of the total. This suggests an important conclusion regarding future trends in higher education, consisting of a transition from the traditional system of extra-mural studies to the "Television Polytechnic" or "Television University" system, in which television lectures are complemented by a network of consultation and examination centres. The importance of this question calls for further extensive research on the economical and pedagogical validity of the "Television Polytechnic" operation, based on fuller and more methodical data than has been available for the preparation of the present paper.

(1) Quotients of 18,036 zł by 28 zł and 33,922 by 28 zł (Tables 6 and 7)

(2) Quotients of 9,702 zł by 28 zł and 17,330 by 28 zł (Tables 6 and 7)

Table 1 - Direct costs, in zlotys, of the "Television Polytechnic" by items of expenditure

Item	1966	1967	1968	1969
Salaries, including 15.5% for social insurance contribution	491,760	1,116,143	1,396,997	1,363,803
Professional fees	821,281	2,005,634	2,651,175	1,688,166
Purchase of film	485,307	1,472,489	1,579,961	364,720
Official travel	101,421	11,579	16,973	-
Materials	51,565	-	-	-
TOTAL	1,951,334	4,605,845	5,645,106	3,418,689

Table 2 - Additional or indirect costs, in zlotys, of the "Television Polytechnic"

Item	1966	1967	1968	1969
Emission and other technical costs	1,138,036	2,685,208	3,301,591	1,993,096
Overhead charges	376,743	888,928	1,092,979	659,807
TOTAL	1,514,779	3,574,136	4,394,570	2,652,803

Table 3 - Total costs, in zlotys, of the "Television Polytechnic"

Item	1966	1967	1968	1969
Direct costs	1,952,034	4,605,845	5,663,106	3,418,689
Additional costs	1,514,779	3,574,136	4,394,570	2,562,903
TOTAL	3,466,813	8,179,981	10,057,676	5,981,592

Table 4 - Number of lecture units by lecture cycles 1966 to 1969

	1966			1967			1968			1969		
	First performance	Repeat	Total	First performance	Repeat	Total	First performance	Repeat	Total	First performance	Repeat	Total
A. Total Lecture units(1)	117	75	192	264	186	450	351	320	662	356	339	695
B. Preparatory courses	66	42	108	Nil	Nil	Nil	37	23	60	155	150	305
C. First year of studies	51	33	84	199	140	339	199	181	382	199	189	388
D. Second year of studies	Nil	Nil	Nil	65	46	111	115	105	220	Nil	Nil	Nil

1. Estimated on the assumption that average of the lecture time was around 30 minutes. The number of hours of emission time is, therefore, around one-half of these figures.

Table 5 - Average costs, in zlotys, of one television lecture

Item	Indices	1966	1967	1968	1969
1.	K.1.	16,684	17,446	16,134	9,603
2.	K.2.	10,167	10,235	8,439	4,919
3.	K.3.	29,630	30,985	28,654	17,055
4.	K.4.	18,056	18,178	14,989	8,736

Table 6 - Average direct cost, in zlotys, for one first performance, one repeat lecture and one first plus repeat performance

Type of lecture	1966	1967	1968	1969
First performance lecture	15,448	16,032	14,480	8,624
Repeat lecture	1,931	2,004	1,810	1,078
First performance plus repeat lecture[1]	17,379	18,036	16,290	9,702
Index number 1966 = 100	100	103.8	93.7	55.8

1. This calculation is used in a further analysis where it is assumed that every viewer watches the lecture and the repeat lecture in order to understand the subject fully.

Table 7 - Average total cost, in zlotys, for one first lecture, one repeat lecture and one first plus repeat lecture

Year	1966	1967	1968	1969
1. Total indirect costs for emissions (Table 2)	1,514,779	3,574,136	4,394,570	2,652,903
2. Total number first and repeat lectures (Table 4)	192	450	662	695
3. Average indirect cost for one lecture telecast	7,889	7,943	6,549	3,817
4. Average direct cost for one first lecture (Table 1)	15,448	16,032	14,480	8,624
5. Average total cost for one first lecture	23,337	23,975	21,029	12,441
6. Average direct cost for one repeat lecture (Table 6)	1,931	2,024	1,810	1,078
7. Average total cost for one repeat lecture	9,820	9,947	8,359	4,895
8. Average total cost for one first plus repeat lecture	33,157	33,922	29,389	17,336

Note It will be seen that, taking 1966 as 100, direct and total costs for one first lecture, one repeat lecture and one first plus repeat lecture, after rising to 102 to 103 in 1967, fell to between 85 and 93 in 1968 and to around 50 in 1969.

Table 8 - Direct and total costs, in zlotys, for different lecture courses

Lecture cycle	1966		1967		1968		1969	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total
Preparatory course	1,100,670	1,955,683	-	-	597,030	1,060,320	1,507,692	2,677,647
Lectures for first year of studies	851,364	1,511,130	3,471,581	6,165,816	3,210,666	5,702,146	1,910,997	3,393,945
Lectures for second year of studies	-	-	1,134,264	2,014,165	1,855,410	3,295,210	-	-
TOTAL	1,952,034	3,466,813	4,605,845	8,179,981	5,663,106	10,057,676	3,418,689	6,071,592

Table 9 - Potential viewers: i.e. candidates for studies and students of the first and second year of higher technical schools during year when television lectures intended for them were given

	1966		1967		1968		1969	
	Total, day and evening and extra-mural courses	Extra-mural courses only	Total, day and evening and extra-mural courses	Extra-mural courses only	Total, day and evening and extra-mural courses	Extra-mural courses only	Total, day and evening and extra-mural courses	Extra-mural courses only
Candidates for higher technical schools	22,915	4,048	-	-	25,078	4,376	27,289	4,468
Students of the first year of studies	24,939	4,397	26,764	4,649	27,359	4,518	30,091	4,881
Students of the second year of studies			23,351	(1967/68) 3,360				

Table 10 - Average total cost (in zlotys) per potential viewer - candidate and student

	1966	1967	1968	1969
Per candidate for higher technical schools:				
1. day, evening and extra-mural courses	85	-	42	98
2. extra-mural courses only	483	-	242	599
Per student of first year studies:				
1. day, evening and extra-mural courses	61	239	208	113
2. extra-mural courses only	343	1,326	1,262	695
Per student of second year studies:		1967-1968		
1. day, evening and extra-mural courses	-	222		-
2. extra-mural courses only	-	1,507		-

Table 11 - Estimated actual viewers of the "Television Polytechnic" lectures

Preparatory course, 1966	5,500
Course of lectures for students of the first year of studies, 1966-1967	12,000
Course of lectures for the students of the first year of studies, 1967-1968	16,500
Course of lectures for the students of the second year of studies, 1967-1968	24,000

Table 12 - Average total cost, in zlotys, of courses for one actual viewer of different courses

Specification	
Preparatory course, 1966	356
First year of studies, 1967	514
First year of studies, 1968	346
Second year of studies, 1967-1968	221

Table 13 - Estimated number of candidates and students systematically watching the lectures

Groups	Preparatory course	First year of studies 1966-1967	First year of studies 1967-1968	Second year of studies 1967-1968
Candidates	320	-	-	-
Students	-	3,660	2,600	8,810

Table 14 - Average total cost (in zlotys) per systematic viewer of different courses

Cost per candidate watching the preparatory course, 1966	6,111
Cost per student watching lectures for first year of studies, 1967	1,685
Cost per student watching lectures for first year of studies, 1968	2,193
Cost per student watching television lectures for second year of studies, 1967-1968	603

Table 15 - Summary of costs per viewer of different categories for different courses (see Tables 7, 10, 12, 14)

	1966	1967	1968	1969
A. Average total cost for one				
1. First lecture	23,337	23,975	21,029	12,441
2. Repeat lecture	9,820	9,947	8,359	4,895
3. First plus repeat lecture	33,157	33,922	29,389	17,336
B. Average total cost for one potential viewer of the lectures:				
1. Candidate for technical higher school:				
a. day, evening and extra-mural courses	85	-	42	98
b. extra-mural courses only	483	-	242	599
2. Student of first year studies:				
a. day, evening and extra-mural courses	61	239	208	113
b. extra-mural courses only	343	1,326	1,262	695
3. Student of the second year studies:		1967-1968		
a. day, evening and extra-mural courses		222		
b. extra-mural courses only		1,507		
C. Average total cost per actual viewer				
1. Preparatory course, 1966	356	-	-	-
2. First year of studies, 1967	-	514	-	-
3. First year of studies, 1968	-	-	346	-
4. Second year studies, 1967-1968		1967-1968 221		

	1966	1967	1968	1969
D. Average total cost per systematic viewer				
1. Per candidate watching the preparatory course 1966	6,111			
2. Per student watching lectures for first year studies, 1967		1,685		
3. Per student watching lectures for first year studies, 1968			2,193	
4. Per student watching lectures for second year studies, academic year 1967-1968		1967-1968 603		

Table 16 - Average total cost, in zlotys, per one potential viewer of lectures for first year studies in relation to average yearly cost of education of one student of higher technical school in 1967

	Average yearly cost of education of one student of higher technical school	Average total cost of lectures per one student of first year Table 10	Relation total of cost of lectures to average cost of education for year 1967
All students of day, evening and extra-mural courses	18,052	239	1.3%
Students of extra-mural courses only	4,522	1,326	29.3%

Table 17 - Average total cost, in zlotys, per one potential viewer of lectures of preparatory course and lectures for the first and second year of studies in relation to the cost of education of graduate from technical studies

	All Graduates from day, evening and extra-mural courses	Graduates from extra-mural courses only
Cost of education of one graduate	156,434	39,396
Average total cost per one viewer (candidate for higher studies, student first year studies, student second year studies) (Table 10)	559	3,432
Proportion of the average total costs per one viewer to the costs of education of one graduate	0.4%	8.7%

PART II: RESEARCH

7. METHODS OF RESEARCH ON THE "TELEVISION POLYTECHNIC"

Andrzej Radźko

1. The team to carry out research on the "Television Polytechnic" was created within the Inter-University Institute for Research on Higher Education just before telecasts started. There were many questions of importance in planning the research to which the answers were not known. How many persons would want to watch the lectures of the first course? What background would they come from? Would collaboration be established between the "Television Polytechnic" and the technical higher schools, in what form? What would be the programmes over the following years?

2. The "Television Polytechnic", was a new enterprise with no traditions behind it. The research team was informed that, in the second semester of the academic year 1965-1966, lectures on mathematics, physics and other subjects would be telecast to help candidates for evening and extra-mural courses of technical studies to prepare for entrance examinations and that in 1966-1967, the "Television Polytechnic" would telecast a course of lectures intended mainly for the students of the first year of technical studies for workers and would, probably repeat the preparatory course. Beyond that nothing was then known. The research team was also informed that the higher technical schools and other organizations would be encouraged to organize consultation centres to help viewers. Finally, the team was informed that it was hoped that the "Television Polytechnic" experiment would facilitate the organization of such institutions in other countries. From this point of view, the following questions would be of special interest. What were the social and territorial bases of recruitment of viewers? How helpful were the television lectures to studies? What were the difficulties encountered in telecasting such lectures, and how were they overcome?

3. It was assumed that the work of the research team would require the participation of a pedagogue, a sociologist, a psychologist and a methodologist. It was also assumed that the basis of the research strategy would be the post factum examination of facts and that the precise choice of subjects for research would depend more on developments than on pre-determined ideas and theories.

4. The first information booklet on the television lectures for the preparatory course could be obtained simply by sending a written order to the central publisher. The research team, by means of television, asked those who ordered the booklet to give personal data about their age, working place, etc. Several tens of thousands of order forms were analysed. This was the first step in research. Later the research team asked the publisher to place in the information booklet a short questionnaire with a request to purchasers to fill and return it. The analysis of this material brought a lot of interesting results. This was the research strategy during the whole period. Research was based on information relating to current activities semester by semester, month by month. Information obtained was quickly reflected in the research operations. When the television lectures of the preparatory course were telecast, that course was being examined; when the consultation centres had been organized they became an object of investigation; and during the examination period the effectiveness of lectures was checked. In short, the research team resembled a camera-reporter following a quickly moving object to take in motion a maximum number of pictures of it in different situations. This conditioned the choice of the subjects for the research the results of which are presented later.

System of research instruments and techniques

5. Most of the investigations were carried out by means of questionnaires sent to the students of technical studies for workers. Some research undertakings were realized by getting the opinions of specialists. A group of professors of higher technical schools was asked to review four television lectures. At the same time, a group of university assistants, skilled engineers and other persons working in the consultation centres was asked to give their opinions on the methods of the television lectures as a middle position between experts

and viewers. The research team also attended the conferences referred to earlier in the paper.

6. From 1968 onwards large scale and systematic use was made of specialists to obtain opinions on the television lectures. Academic staff of higher technical schools and experienced secondary school teachers were provided with exact directives on how to give their views on the series of lectures, and especially on the lectures on mathematics and physics.

7. The questionnaires sent to the students of technical studies for workers were mostly non-recurring questionnaires. Most of them included questions on all the courses intended for the given year of studies, and were sent after each lecture course finished. Thus actual students of the second year gave their opinions on the lectures for the first year given in the previous year and students now admitted to the first year of studies gave their views on the previous preparatory course lectures. The largest part of the questionnaires were distributed by the post, not by interviewers in direct touch with respondents, since it was not possible to employ an adequate number of interviewers.

8. In May 1969, a group of several hundred systematic viewers from among first year students of the evening and extra-mural technical courses was organized and again in 1970 when it was added to by a number of university students who were watching the lectures on mathematics and physics. These viewers filled exactly the same questionnaires after each lecture, thus they answered questions on a single lecture, not on a course and they were questioned several times, not just once.

9. The typical student of the technical studies for workers is a man graduated from a secondary, or mostly a vocational school some years before and now holding a middle-level job in industry, transport or building. Most of them are married. They have to face problems in combining three areas of activity; professional work, family life and studies, which makes hard demands on time and strength. Questionnaires addressed to such respondents should not include complicated questions but should consist of "closed" questions, i.e., provided with a range of answers. Nor should the questionnaires include too many questions. At the beginning of the research activity, several extensive questionnaires including complicated and "open" questions were used. A very small number of respondents returned these questionnaires; answers to most of the questions were missing; answers to the "open" questions were short and ambiguous; answers to both "open" and "closed" questions were often haphazard and as between separate questionnaires could be seen to be often contradictory.

10. Hence, the following directives concerning the questionnaires were established: few questions, "closed" questions for preference, choice of questions of a type that can be answered almost offhand. It is obvious that such an approach makes it almost impossible to collect opinions on complex problems. On the other hand, it was proved that it was possible to obtain good results if answers to "closed" questions were prepared carefully. The team was specialized in this, and some questions were provided with up to twenty response patterns. Sampling distributions showed no significant trend, (e.g. at the level = 0.05) in the guidance of the respondents by the sequence of response patterns. The authors of the questionnaires tried to formulate the questions and the response patterns in colloquial Polish within the vocabulary of an average technician employed in a factory. Experience also showed that proper wording of the accompanying letter was of great importance in relations with respondents, who should be helped to feel that their answers could throw light on matters which had not been clarified till then.

11. The research team had at its disposal other material which it collected itself. This included data on progress in studies, which was estimated by means of marks obtained in different subjects at entrance and semester examinations. The Ministry of Education and Higher Schools has systematic records of the results of these examinations in separate higher schools and faculties. Data collected by the research team were compared with the statistical data of the Ministry to assess results obtained by systematic viewers of the "Television Polytechnic" lectures as compared with results obtained by all the students of technical faculties and those obtained by the students of evening and extra-mural courses. In the years 1966 and 1967, members of the team paid visits to consultation centres, and had interviews with students and heads of the centres. In 1967 occasional surveys were also carried out with the help of specially chosen viewers from among people who were taking examinations after the first year of studies. The reasons for which the team did not undertake research by any other method will be explained later.

The problems of selection of samples

12. One of the problems during several years was to estimate the size and the structure of the viewing audience for different courses. The lectures were intended for students of technical studies for workers. However, the actual audience watching the lectures and the intended audience population overlapped. The lectures were watched, among others, by students of different non-technical studies, by students of day courses and persons not studying e.g. engineers, technicians and teachers. In 1968 the Public Opinion Research Centre of the Radio and Television Commission tried to estimate the size and the structure of the actual viewing audience. It used quota sampling of the professional categories which might be expected to watch the lectures. The research team, on the other hand, was interested in the part of the population for which the television lectures were intended. It was interested:

(a) in all the students of a given year of technical studies for workers and;
(b) all the students of technical studies for workers people watching the "Television Polytechnic" lectures.

Within the latter it was interested in (i) all viewers of the lectures (not taking into account how often they watched the lectures) and (ii) the systematic viewers of the lectures (i.e. regular viewers).

13. Representatives of the total technical student population could be selected either at random or by sampling. In choosing the sample it would be possible to consider different higher schools and specializations in studies, mechanical, building, etc. Sex, age, profession, results obtained in secondary school and other features could also be considered. Proportional allocation would here be suitable, but in the case of samples containing a few hundred persons the numbers of students of smaller higher schools, especially higher engineering schools, would be too small to make any correlative analysis between them. While the estimation of the number of students of a given higher school and of the number of students of a given specialization are comparatively easy, determining the structure of students by age, sex and especially by profession and results obtained in studies requires much work. It is obvious that whereas it is possible, though difficult, to collect data referring directly to the structure of the total technical student population, such an operation for the viewing audience of the "Television Polytechnic" was unrealizable. Watching the lectures was not obligatory; it was at most recommended. Consequently, there were several reasons for accepting random sampling. The same difficulties would arise with different versions of stratified sampling. As from 1966, letter sampling was accepted although this involves risks and errors. To avoid errors, the research team tested the hypothesis about the lack of correlation between the first letter of a name and the variables researched. Examination of separate samples showed that there was no reason to reject the hypothesis that the criterion of selection and the territorial pattern of higher schools, place of living, specialization in studies, age and sex were uncorrelated values. This seemed to be sufficient to show that letter selection was equivalent to random sampling.

14. While the team had at its disposal the proper representation of the student population, it received completed questionnaires from only a part of these to whom it was sent by post. Sometimes less than half of replies were received. It seldom happens with surveys carried on by means of the post that the percentage of responses reaches 100%. It was expected that viewers of the lectures, especially the systematic ones, would be overrepresented among those who sent in replies, and that those not watching would be insufficiently represented. Hence, the samples examined were marked by errors concerning the characteristic of most interest to the team, i.e., systematic viewing of the lectures. However, the structure of the samples examined for several other characteristics did not differ from the structure of the samples as assumed. Therefore, it can be considered that if a systematic error occurs in the results it will concern only the structure of students watching the lectures. Consequently, if the samples realized differed from the assumed samples of the total number of students, they constituted, however, a proper representation of the viewing audience including the systematic viewers. The greatest difficulty was in estimating the actual percentage of persons watching the lectures, especially that of systematic viewers, in relation to the total number of students of evening and extra-mural courses. A further difficulty arose from the procedure of sending questionnaires to viewers in respect of the lectures they had seen the year before. There were reasons to do this for lecture courses intended for the students of the first and second year of studies. In the case of the preparatory course this procedure was indispensable, because it was impossible to select a sample from among those persons actually watching the lectures since there were no data for defining the total viewers audience for the preparatory course lectures. According to the data obtained by the Radio and Television Commission, these lectures were watched by different people and for different purposes, e.g., by the secondary school teachers and by pupils in the final classes of grammar schools who did not intend to undertake technical studies but considered the lectures useful for final secondary school examinations etc. Another complication derived from the fact that the questionnaires were not, in all the surveys, sent to people who failed examinations and either discontinued studies or repeated a year of studies. This concerned especially research on the preparatory course. Most probably, if the questionnaires concerning the preparatory course had been sent not only to those who passed and started studies, but also to those who failed the distribution of intensity of watching the lectures would be modified. There are no reliable estimates regarding this but it is likely that the percentage of systematic viewers among those not admitted to studies would be greater than that for those who were successful in entrance examinations. This supposition is based on one of the essential conclusions of the research done and presented in this paper, namely, that the candidates for studies having comparatively less chances, e.g., elderly persons, graduates from secondary schools with poor preparation for studies etc., constituted the majority of the systematic viewers of the lectures. A parallel situation arose in research carried out with students of the second year of studies on the lectures for the first year of studies watched by them a year before. In that case, especially in the years 1966-1968, people who failed in the examinations of the first year and could not study for the second year were also omitted in the

distribution of questionnaires. As from 1968, efforts were made to bring that group under consideration. It was, however, very difficult to obtain their names and addresses and, what is more important, the percentage of replies from them was considerably lower than that for people who continued studies successfully. The percentage of viewers in the number of persons who failed the examinations and who replied to the questionnaires was lower than the percentage of persons continuing studies. This is why the figures for the number of viewers of the lectures, especially that for systematic viewers, given in the present paper, should be considered as over - rather than under-estimated.

Methods of analysis and presentation of research results

15. The different research activities covered many groups, ranging from several hundred to several thousand persons. For the mass research it was necessary to use multiple counter adding machines except for a few activities. Analysis of the results of the remaining research activities was done by means of statistical machines. Although digital computers would be more suitable for the purpose, organizational problems imposed the first-mentioned technique. The code key was elaborated for each questionnaire and the replies to the questions were put into code. The coding was then carried on to punched cards in such a relation that one card corresponded to one questionnaire, and individual types of replies were mechanically calculated. In turn, a programme of so-called correlations, i.e., cross productsof reply patterns to the chosen question and reply patterns to other chosen questions, was elaborated. The results were usually calculated in percentages with a degree of accuracy corresponding to the size of the analysed sample.

16. The list of independent variables chosen for the purpose of analysis was as follows:

sex,
age (intervals 18 to 24 years, 25 to 29 years, and then 10-year intervals),
time after graduation from secondary school (2 and 3-year intervals, then 5 and 10-year intervals),
type of completed secondary school (grammar school, vocational school, etc.),
method of study (extra-mural, evening and day courses),
specialization in studies (e.g. mechanical, electrical, building),
subject of lectures (mathematics, physics, chemistry, descriptive geometry, technical drawing, electro-technics, mechanics of materials),
branch of the national economy in which the respondent was employed (industry, building, transport, education and others),
type of institution in which the respondent was employed (industrial enterprise, scientific institution, school, etc.),
professional position (high management post, medium post, lower post, instructional post, executive post),
required or desirable professional qualifications (higher education, higher or secondary education, secondary education, less than secondary education),
place of living (town of over 100 thousand inhabitants, 20 to 100 thousand inhabitants, less than 20 thousand inhabitants, small country towns),
distance in time of travel to the higher school in which the respondent studied,
working day of the respondent, including travel to and from the place of work,
possession of television set at home.

These variables were taken into account in many of the research operations but not in all. The value of some of the variables was established on the basis of arbitrary answers of respondents. In some research operations the list of variables was different from that presented above. This makes it difficult to compare some of the results.

17. Most of the research work was presented in separately prepared reports. The reports were elaborated as follows: description of the assumptions of the research, description of sampling methods and results of sampling, characteristics of respondents in relation to the variables chosen for the questionnaire as well as their social and demographic characteristics, description and comments on the structure of replies, description and comments on the results of correlation analysis, assessment of the results, conclusions.

Methodological and organizational difficulties

18. The research team encountered the following main methodological and organizational difficulties:

impossibility of direct estimating of the size and demographical structure for the preparatory course lectures,
differences (sometimes considerable) between the samples assumed and those realized,
abolition of the television consultation centres, which made it impossible to carry out several planned experiments,
lack of possibility of organizing experimental and control groups in a different way,
lack of established future programme for the activities of the "Television Polytechnic", which made it impossible to plan research in advance,
the fact that the inconvenient time of the telecast was so overwhelmingly considered as the major obstacle to viewing made it difficult to obtain and analyse information about other obstacles and to give proper weight to these.

8. SOCIO-DEMOGRAPHIC CHARACTERISTICS OF VIEWERS OF THE "TELEVISION POLYTECHNIC"

Barbara Majewska-Radźko

1. Data referring to demographic and social characteristics of viewers were collected as correlates of their opinions of lectures, intensity of watching them, their effectivenesss, etc. In the present chapter is presented the important information concerning the social-demographic structure of respondents and viewers obtained by successive questionnaires. An account of the other results obtained is given in the chapter entitled "Opinion of 'Television Polytechnic' viewers on the lectures for first year of studies".

First questionnaire survey

2. The first questionnaire included eight substantive questions regarding: sex, age, type of secondary school, time of graduation from secondary school, final marks in mathematics and physics, profession and position occupied. The selection of respondents was rather haphazard. The interviewers went to higher technical schools on days of taking examinations by evening and extra-mural students and distributed questionnaires during the breaks. The structure of the respondents regarding their socio-demographic characteristics was similar to that of the total student population of evening and extra-mural courses. There were, however, some differences between the total viewing audience and the respondents in relation to the territorial structure.

3. Extra-mural students formed 65.4% of the total number of respondents, and students of evening courses 33.8%. Data, in percentages, concerning distribution of these respondents by sex, age in relation to method of study are presented in the following tables.

	Male	Female
Extra-mural courses	65.1	73.2
Evening courses	34.3	26.8

	Over 40	31-40	26-30	21-25	20 and less
Extra-mural courses	69.2	75.3	72.6	56.3	26.3
Evening courses	30.8	23.6	27.4	43.0	73.3

4. As for jobs held by the respondents and the qualifications required for them the situation was as follows. Posts were divided into:

(a) those for which not even full secondary education was required,
(b) those for which secondary education was necessary,
(c) those for which higher education was desirable though not indispensable,
(d) those for which higher education was required.

It appeared that 8.4% of the respondents worked in posts of (a) type; 39.4% in posts of (b) type; 41.6% in posts of (c) type and 10.3% in posts of (d) type. The types of posts held by the respondents were also broken down by sex and age, with the following results:

	(a)	(b)	(c)	(d)
Men	8.5	36.5	40.6	10.1
Women	3.6	50.0	32.1	3.6

	(a)	(b)	(c)	(d)
Above 40	3.8	30.8	46.2	19.2
31-40	4.5	27.5	46.6	16.3
26-30	9.9	36.3	37.2	10.8
21-25	8.6	45.5	38.0	3.9
20 and less	31.6	36.8	21.1	0

(Note: the total percentage is not always 100% as in previous tables.)

5. Data concerning the results obtained in examinations and given on their secondary school final certificates showed the following: in mathematics 45.2% got "satisfactory", 40.8% "good" and 13.7% "very good"; in physics 47.2% got "satisfactory", 45.0% "good" and 7.4% "very good".

6. These results, and other information obtained during research, indicate that a large number of respondents held relatively high posts, had rather low marks in secondary school, and were lacking in so-called professional experience (in terms of length of period of work) that would justify their appointment to exposed posts.

Second questionnaire survey

7. The second questionnaire survey, carried out two years after the first one, showed that 45% were studying in extra-mural courses and 55% in evening courses; that 79% were men and 21% women; and that the percentages of persons holding posts of different types with regard by required qualifications was: for "a" type 6%, for "b" type 47%, for "c" type 35% and for "d" type 12%.

Characteristics of the viewing audience covered by the first survey

8. The group chosen at random among viewers of the lectures for first year of studies for workers numbered 311. There were 171 studying at evening courses (55%) and 138 persons in extra-mural courses (44.4%). Men formed 92.3% and women 7.7% of the group.

The structure of the group of viewers by age presented was as follows:

Age	Number	Percentage
Under 25 years	182	58.5
25-29	79	25.4
30-34	35	11.3
35-39	11	3.5
40-49	3	1.0
no information	1	0.3
In total	311	100.0%

Thus, it seemed that a typical viewer was a young, less than 25 years old, man who took up studies one or two years after passing final secondary school examinations. He studied in evening courses and watched television lectures at home. He lived in a highly industrialized area.

9. The first correlations made are those between sex and age of viewers and the type of study course. It is worth while noting that while among men those under 25 formed 56.5% and those over this age formed 43.5%, 83.4% of women were less than 25. Students of evening courses were more numerous than students of extra-mural courses, and this tendency was even more marked with women, of whom 67% attended evening courses and 33% extra-mural courses. It seems clear that, if a woman takes up studies, she most often belongs to the youngest age group, and that she chooses evening or extra-mural courses only, as a rule, when she is single and has no children and very often moreover when she has help from her parents so that she can manage on a modest salary in normal working time without having to take an extra job. Such women usually chose evening courses which are easier, though more time-consuming, than extra-mural courses. Once a women has a family, she seldom takes up studies at the same time. One more peculiarity should be pointed out. The large majority of the total number of viewers graduated from secondary vocational schools. But while among the men only 18.2% graduated from grammar schools, the percentage of graduates from grammar schools among women viewers was as high as 62.5%. It seems that more male graduates from secondary vocational school take up technical studies in evening or extra-mural courses than male graduates from grammar schools, whereas more women start technical studies after leaving grammar school than after a secondary vocational school. It seems that a man's level of education depends on his decision to a greater extent than is the case with women who are more influenced by their parents. Parents sending a daughter to a secondary vocational school usually do not expect her to continue studies. On the other hand, parents who send a daughter to a grammar school want her to have a higher education by any means. If, therefore, the daughter is not admitted to the indicated course of higher studies they try to find possibilities through another course extra-mural or, even more frequently, evening courses. It should be emphasized, however, that this is only an hypothesis, requiring more research.

10. As for the correlation of age with the method of study, it appears that the majority of viewers tended to choose evening courses. Among viewers up to 25 years old the percentage of those taking evening courses was 64.9% and of those following extra-mural courses was 35.1%. Among older people 41.7% attended evening courses and 58.3% studied extra-murally.

11. The correlation of the age of viewers with the types of higher education for workers is shown in the following table:

Age of viewers	Percentage of graduates from secondary schools			
	Day school	Evening school	Extra-mural courses	Correspondence courses
Under 25	82	15	2	1
25-29	62	24	14	-
30-34	49	37	11	3
35-39	46	18	36	-
40-49	-	67	33	-
In total	71.1	20.6	7.4	0.6

12. The last data to be presented concerns the participation of viewers in the activities of the television consultation centres. It emerged that 10.9% of extra-mural students and 5.8% of evening course students among the viewers participated in these activities.

Characteristics of the viewing audience covered by the second survey

13. Of those covered by the second survey 61.3% were following evening courses, and 38.7% extra-mural courses. Thus, it can be observed that the number of students of evening courses already greater than that of students of extra-mural courses was still increasing. The structure by sex underwent slight modifications. Men formed 88.8% of the total and women 11.2% - an increase in the percentage of women which also accords with general trends. The age of persons taking up technical studies for workers is also falling. Of those covered by the second survey 63.6% were less than 25 (of whom 19.3% were 18 to 21). People between 25-30 formed 22.4% and those over 30 formed 14%. Another tendency, though not so clear, could also be observed, namely, that people taking up technical studies for workers are increasingly graduates from day secondary schools. On the other hand, graduates from evening and other types of secondary schools for workers are more and more rarely found among students of the first year of studies. From another source it is known that this trend is to be explained by the fact that the number of secondary schools for workers and the number of persons attending them decreases year by year. Since conditions for study in Polish secondary schools are now very good (tuition is free, the system of scholarships and boarding schools is fully developed), the large majority of young people wanting to acquire secondary education do so in day schools and only take jobs after completing secondary education. In the first survey it was found that 71.1% of those covered had graduated from day secondary schools, 20.6% from evening secondary schools, 7.4% from extra-mural schools and 0.6% from correspondence schools. The second survey showed that 73.3% had graduated from day secondary schools, 21.4% from evening secondary schools and 5.3% from extra-mural and correspondence schools.

9. ROLE OF THE PREPARATORY COURSE IN RENDERING HIGHER EDUCATION ACCESSIBLE

Barbara Majewska-Radźko

1. Research on viewers' opinions regarding the usefulness of the television preparatary course in preparing for entrance examinations to higher schools was made difficult because the total viewing audience for the course was not known. This made it impossible to establish a representative sample. The only possible approach was to examine a posteriori the opinions of people who started studies the year after the course. Research was carried out in 1969-1970 regarding the preparatory course telecast in 1968-1969. The course covered mathematics, physics and technical drawing.

2. For this research the sample was selected by means of cross-stratified sampling. Statistical strata established were, on the one hand, the students of technical and other studies and, on the other, the students of day, evening and extra-mural courses. Proportional allocation was purposely not applied. Data received from the students of evening and extra-mural courses were considered as basic material. Data from other respondents were used as a comparative background. From among study courses other than technical ones the research took into account those for which the entrance examinations included mathematics. Thus the sample included students of universities, higher economic, pedagogical and agricultural schools. However, nearly 70% of the whole sample were students in higher technical or engineering schools.

3. It will be seen that the sample represented only a part of the total audience for whom the preparatory course was intended. Many candidates for studies were not admitted, as happens every year, either because they failed the entrance examination or because there were not enough places. They were not included in the sample although they may, in fact, have watched the course. Consequently, the effectiveness of the lectures is only discussed in relation to people who were admitted to higher studies. This means that some important questions could not be dealt with, such as the size of the audience for the preparatory course, frequency of watching the lectures, and correlations between systematic watching and success in the entrance examinations. It would, of course, be possible to carry on research with a sample including both students and persons not admitted to studies but this would be very complicated.

4. Of the total number of respondents a little less than 20% did not watch the lectures at all, yet the percentage of systematic viewers of the lectures on one subject, at least, was the same. Around 60% watched lectures sporadically, i. e. 10% to 25% of lectures on particular subjects. The percentage of systematic viewers, among candidates for technical studies, of the lectures on technical drawing did not exceed 10%. The lectures on mathematics were those watched the most systematically, and the lectures on physics were very popular too, especially with candidates for technical studies. The percentage of systematic viewers was a little higher among candidates for day studies than among the candidates for studies for workers, although the lectures were primarily meant to help the latter. To sum up, it can be said that a large majority of candidates for studies watched the preparatory course but a large majority of them did it unsystematically.

5. It appeared, as it did in other research, that the inconvenient time of telecasting the lectures was a dominant difficulty. The afternoon emission was too early not only for nearly all the candidates engaged in profesisonal work but also for the majority of pupils of the final classes of secondary schools. The night emission (as a rule between 11 and 12 o'clock p. m.) was too late to be popular with workers who usually got up at about 5. 30 a. m., to get to work. Even those who decided to watch the night emission at the cost of losing sleep derived little profit from their efforts because of tiredness. More than 3/4 of workers explained that this was the reason for their unsystematic viewing. Of those who did not watch the lectures systematically 15% said that they had no television set.

6. The majority (about 2/3) of the respondents found the lectures "rather easy" or "moderately difficult". Only 5% of them found that the lectures appeared "very difficult". The lectures on mathematics were found easy more often by pupils or graduates from grammar schools than by pupils or graduates from secondary vocational schools. The lectures on physics appeared also to be easier for pupils of grammar schools, but they were more difficult for graduates from grammar schools than for graduates from secondary vocational schools. The reason may be that in the two final classes of secondary vocational schools physics is not taught, so that the pupils can forget quite a lot. A few years after graduating from secondary school, the level of graduates becomes equal and the lectures of physics are found easier for technicians than for graduates from grammar schools.

7. A very large majority of the respondents made critical comments and demands. Most concerned the time of telecasting lectures. It was suggested that the afternoon lectures should be emitted between 4 and 5 p. m., and the night lectures between 8. 30 and 9. 30 p. m. This could not be done so long as Polish television operated on only one nationwide channel. Other proposals suggested lectures not only in the latter half of day but also between 5 and 6 a. m., and on Sunday and holiday morning. The main substantive demands

were as follows: to give lectures on physics much more of an object lecture character; to increase the number of experiments and demonstrations; to discuss more fully practical application of theories presented; to present in more detail the procedures for solving difficult mathematical problems; to slow down the rate of lecturing and prolong the time of the lecture unit from 30 to 45 minutes.

8. The lectures were for the most part watched individually and only exceptionally in organized groups. In a few places such groups were organized spontaneously. Nearly all the viewers tried to take notes during the lectures. Most of them would try to take detailed notes but, of course, they could not keep this up; those who were inclined to use abbreviations had the same trouble. Nonetheless, only few viewers made notes immediately after the lecture was finished when they still had its content fresh in their memory. The main obstacle was certainly lack of time or simply tiredness. On the other hand, many of the viewers of the lectures, especially of those on mathematics, read the manual immediately after the lecture so as to fix the material in their memory. Many of those watching the lectures on physics did exercises referring to the material of the lectures, published in the popular youth newspaper "Sztandar Młodych". At the same time, less than 20% of the viewers prepared to watch the lectures by reading the corresponding section of the manual.

9. In the entrance examinations nearly 40% of the systematic viewers of the lectures on mathematics and nearly 30% of the systematic viewers of the lectures on physics said that they faced questions for which they knew the answers thanks to the lectures. More than 60% of those who were asked questions, during entrance examinations, related to the content of the television lectures said that the knowledge derived from the lectures contributed to obtaining the good or satisfactory marks. Only 2% of the systematic viewers said that for them the lectures had no importance in passing entrance examinations and that, consequently, they could as well not have watched the lectures at all. Nearly all the systematic viewers who were asked questions not related to the entrance examinations, as well as the majority of sporadic viewers, declared that the lectures were worthwhile watching. What were the reasons for this opinion? The lectures were conducted by professors of higher schools who applied didactic methods different from those in common use in secondary schools but accepted in higher education and these were the methods applied in entrance examinations. The television form of teaching seems to be better adapted to the requirements of entrance examinations. The lectures covered basic questions familiarity with which is indispensable to understanding many other problems. On the other hand, they dealt with difficult problems which were not always explained in manuals or during lessons at school. The lectures on physics were richly illustrated with experiments and demonstrations which could not be done with the apparatus of a normally equipped physics laboratory in a secondary school. The lectures also stimulated individual work. Viewers could and did refer to the manual when they did not comprehend one or other part of the lecture. The level of the lectures seemed surprisingly high, and their substantive content unexpectedly rich for many of those who had just completed their secondary education. This allowed them to correct their ideas and intensify their efforts during the months preceding entrance examinations.

10. OPINIONS OF SECONDARY SCHOOL TEACHERS ON SOME "TELEVISION POLYTECHNIC" COURSES

Andrzej Radźko

1. In addition to its research work on the opinions of viewers regarding the lectures, the research team sought the opinions of specialists on the lectures. They were asked for their views three times:

(a) regarding the lectures for the first year of studies in spring 1967,

(b) regarding the preparatory course in spring 1969

(c) regarding the preparatory course in 1970.

2. In 1967, several consultation centres were in operation. The research team hoped that, through these centres, it would be possible to collect opinions on the television lectures from students as well as from consultants at the centres. The research team made contracts with several consultants to review the course of lectures telecast in spring 1967. It was also decided to ask several professors of higher technical schools to review the same course. The number of the reviews received was less than was expected. On five lectures on mathematics the team received 13 reviews, six by the professors and seven by the consultants. The number of the consultation centres decreased considerably during the next years. In these circumstances, it became necessary to abandon reviewing of lectures by the consultants. Instead, it was decided, in 1969, to organize a network of reviewers from among secondary school teachers to give their opinions on the preparatory course.

3. The research team decided that it would be useful, as in 1967, to compare the opinions of grammar school teachers experienced in teaching mathematics and physics with the opinions of professors of higher schools. The results proved to be of little value. Eight lectures on mathematics and six lectures on physics were reviewed. The research team received 40 reviews of lectures on mathematics sent in by three professors of higher technical schools and two secondary school teachers and 24 reviews of lectures on physics prepared by two professors of higher schools and one secondary school teacher.

4. The following questions were put to the reviewers:

Was the subject of the lecture completely covered?

Did the lecturer make good use of the time available to deal with the problems presented?

Was the rate of lecturing right and adjusted to the difficulty of the material presented?

Was the language comprehensible and well spoken?

Were the visual and verbal elements combined properly?

Was it possible to notice in the lecture any good didactic concepts or any exceptionally attractive methods of presentation?

Were the technical possibilities of television used sufficiently? If not, what improvements might be introduced?

5. In 1970, a new system was organized with the object of collecting reviews of the lectures of the preparatory course which had the same content as the lectures reviewed in 1969. Changes were made in the choice of reviewers. A group of reviewers was carefully selected from among the teaching staff of secondary schools coming from the group of teachers collaborating with the Central Methodology Centre, which deals with improving teaching methods and popularizing good methods.

Questions of content raised in the reviews

6. Many criticisms were made of the selection of topics for the courses, some criticizing the inclusion of certain topics in the preparatory course and others the omission of certain topics. Criticisms were also made of the content of individual lectures. In the reviews of the preparatory course for 1969, prepared by professors of higher schools, there were comments on the general approach, but they were contradictory. This is probably due to the existence among Polish higher school teachers of several different "schools" of teaching. While the curricula are unified and set out in detail different approaches to a given problem or group of problems can be found in different higher schools. Given the considerable popularity of the television lectures, the selection of lecturers takes on significance. The lecturer selected represents a given "school" and thus, the television lectures present the approach characteristic of that "school". The problem concerns especially the content of lectures on mathematics and physics for students of the first year in engineering higher schools. It is intensified by the existence of different textbooks covering the same curriculum, but in different ways.

Didactic problems

7. The most important didactic problem was the length and speed of the lectures. The curricula of the courses in the years 1966 and 1967 covered so many themes that the material designed for one television lecture of less than 30 minutes was the same or even greater than that designed for two classroom lectures each of 45 minutes. It is true that thanks to audio-visual means used in the television lectures it is possible to use time more effectively. Nevertheless, the opinions of viewers in the years 1966 and 1967 and the reviews prepared by the consultants of consultation centres and those prepared by professors of higher technical schools showed that at that time the lecturers were more

preoccupied with covering all the themes in the course than with the rate of lecturing. The professors and the consultants were almost unanimously of the opinion that the rate of lecturing was too fast. Some of them said that it was so fast that only the cleverest viewers could follow the lectures and then only if they had previously studied the subject in the textbook. The 30 minutes allotted to a lecture was clearly insufficient for some subjects. Many reviewers suggested the need to revise the curriculum of the course so as to reduce the material to be covered during each lecture unit.

8. In the following years, the situation regarding the rate of lecturing improved. In 1969, expressions like "intense pace" and "telegraphic compression" were not so common in the reviews. The curricula were changed and the courses were designed to cover only selected basic topics or topics which were specially difficult and those which resulted in new applications of science and technology. In the meantime it was seen that lecturers were reducing their rate of lecturing, some of them to the point that some viewers in 1968 found it too slow. In 1969, however, neither the teachers of secondary school teachers nor the professors of higher schools who reviewed the lectures found the rate too slow. Among the lecturers there were experienced professors who had given lectures from the beginning of the "Television Polytechnic", who had learnt to adapt their methods to the conditions and demands of television lecturing.

9. Viewers found that, in general, the lectures were given in clear and comprehensible language. Several lecturers used elements of colloquial, as distinct from academic, language. Views were divided on this; some viewers objected to it while others felt that it helped to make the lectures more easily and more widely understood. There were also divergent opinions as between professors of higher schools and secondary school teachers regarding the nomenclature and symbols used in the lectures. The first group approved the nomenclature and symbols used without reservations. However, the second objected to uses which were different from those of secondary schools. It is to be noted that, because of the importance of the experiment, professors of higher schools were engaged as lecturers for the preparatory courses. In Poland, there are differences between teaching methods in secondary school and in higher school. These differences were felt by students taking up first year of studies who were accustomed to secondary school teaching methods. Indeed before the "Television Polytechnic" started the question was raised whether pupils at secondary school and graduates from them who had not yet started higher studies would get sufficient benefit from lectures given by methods which were strange to them. Reviews prepared by secondary school teachers (which were of special importance in this matter) confirmed that the experiment was successful. The only serious objections concerned the symbols and nomenclature. These are standardized in secondary school teaching thanks to prescribed textbooks, but not all of the television lecturers used the same symbols, etc. Some, though not many, secondary school teachers approved such divergencies and emphasized their value in mental training.

10. Some secondary school teachers said that the introductory parts of some lectures were too long and too elementary given the level of knowledge of pupils of final classes of secondary schools. This opinion concerned lectures on mathematics rather than those on physics. It is possible to suppose two reasons for this. First, while the lecturers were experienced lecturers at university level most of them had no personal experience of teaching at secondary school level and hence spent too much time on elementary matters in their concern that, otherwise, the viewers might not understand further lessons. Secondly, the structure of some lectures required covering relatively extensive elementary questions so as to be able to refer back to them in presenting the problems which constituted the main subject of the lecture. Reviewers also noted that some lecturers did not make enough use of information already given in previous lectures. Usually one lecturer gave several lectures and was then replaced by another, but it happened also that lectures were given by a different lecturer every week. While lecturers would refer to their own former lectures it happened that they did not refer to lectures given earlier by other lecturers.

11. The above mentioned questions evidently cover only a part of the didactic problems of television lecturing. It would have been possible to collect opinions on other didactic problems but the present research team could not do this. To undertake a total examination it would be necessary:

(a) to increase considerably the number of experts,
(b) to review all the lectures of a cycle,
(c) to discuss the curriculum of a course with a group of experts and then to give effect to their conclusions,
(d) to consider the possibility of using the results of some experiments in preparing the programme of the lecture courses,
(e) to establish and apply principles for choosing lecturers taking into account research needs.

Use of television technique in lectures

12. Reviewers of the lectures commented on three aspects of the use of techniques available to television lecturers: possibilities of manoeuvring with cameras; demonstration of motion and through motion; selection of teaching aids and means of demonstration.

13. The largest part of the lectures on physics and a considerable part of the lectures on mathematics were presented with ample illustrations and demonstration. The reviewers found that the opportunity of observing demonstrations in detail, which is impossible in classroom lectures, was the

outstanding valuable feature of most of the lectures, especially those on physics. It sometimes happened however, that cleverly planned experiments the elements of which were perfectly "seen" by the cameras did not bring expected effects for the viewers (note that there were no colour telecasts) and sometimes could mislead them. This occurred most frequently in lectures on optics. Insufficient imagination of the television producers regarding the final effects on the screen also affected the quality of some other lectures. For instance, during the lecture on the prism, the minimal angle of deflection was to be demonstrated, but the demonstration failed and perhaps even misled viewers, because of improper adjustment of the light ray. During the lecture on alternating current, the three-phase synchronous motor was demonstrated and on the black and white screen its rotor looked like a homogeneous roll. Such faults were probably due to the still limited experience of the television staff in the direct transmission of lectures; it should be remembered that the lectures were not first filmed and then transmitted.

14. The major advantage of the television lectures was found in demonstrations of motion and demonstration through motion, in the lectures on physics and also on mathematics and especially geometry, in which demonstration through motion was intensively and ingeniously used. The animated drawings used in the lecture on propagation of light were highly appreciated. Their effect would be intensified if the lectures were telecast in colour.

15. There is another advantage, of a different type, peculiar to the television lecture. The television lecture is not just one of thousands of lectures given on the same subject in all the secondary schools on the same day; it is the only lecture on the nation-wide scale. The lecturer has a greater assortment of teaching aids and laboratory equipment at his disposal than a teacher of the average secondary school and he is, generally, more skilled and ingenious in using these than the average secondary school teacher. The reviewers laid more stress on the importance of inventiveness in using equipment than on the availability of specially chosen equipment. In the course on physics, for instance the lecture on electric oscillation during which a very ingenious system for observing damped oscillation was used, was highly appreciated. The average teacher of physics expects of a television lecture intended for secondary school pupils that it should be rich and ingenious in the use of experiments and demonstrations which cannot be achieved in a school physics laboratory. However, many reviewers considered that using equipment unfamiliar to pupils of secondary schools was not helpful. Maybe, the solution would be to work out a programme of experiments that can be carried out by means of equipment which should be, at least, known to graduates from secondary schools but which are not found in every school laboratory.

11. VIEWERS' OPINIONS ON THE LECTURES FOR THE FIRST YEAR OF STUDIES

Barbara Majewska-Radźko

1. Two surveys, by questionnaire, of viewers' opinions on lectures for the first year of studies were made, in 1969 and in 1970. In the first survey 311 students of evening and extra-mural courses of technical studies replied, and in the second 393 students of technical studies and 131 students of non-technical faculties of other higher schools.

Frequency of Viewing

The respondents in the first survey, in 1969, watched the lectures as follows:

(a) Working days and Sundays:

	Regular viewers	Not regular viewers	Not watching
Working days	17.5	32.1	47.8
Sundays	14.3	41.9	40.5

(b) By subjects:

	Regular viewers	Viewers of approx. half of lectures	Viewers of few lectures	Not viewers
First semester:				
Mathematics	9.4	16.4	44.7	25.0
Chemistry	2.2	5.0	14.1	55.7
Descriptive geometry	6.8	11.1	31.3	35.8
Technical drawing	1.7	3.6	13.7	57.4
Second semester:				
Mathematics	10.1	15.4	39.9	28.7
Physics	6.3	8.3	27.0	43.4
Descriptive geometry	5.0	8.3	20.0	46.7
Technical drawing	1.6	4.3	12.5	58.9

(Where the percentages do not add up to 100, it is because of people who did not answer the questions).

Difficulties in watching the lectures

2. All the respondents, besides those watching the lectures systematically, were questioned and were given categories of difficulties in watching the lectures. The results, in 1969, were as follows, in percentages:

	Working days	Sundays
Professional work	19.7	10.1
Lectures in higher school	13.9	24.5
Attendance at consultation centre	3.4	3.6
Time spent in travel	6.6	5.6
Lack of television set	19.5	18.9
Family duties	10.6	10.3
Other reasons	14.7	14.0
No reasons given	11.6	13.0

It will be seen that on working days, the conflict with professional work comes first, and on Sundays the conflict with lectures in higher school. People employed in concerns working twenty-four hours constituted 10% of persons not watching the lectures at all or missing some of them. At the consultation centres it could happen that the consultant in mathematics switched off the set after the collective watching and conducted the consultation, while the lecture on physics was being telecast. Besides the obstacle presented by time lost in travel between home and work, long journeys discouraged students who had no television set from travelling to consultation centres on Sundays. The slight difference in the data as to possession of television sets can be explained by the fact that some students could watch the lectures at friends' houses on Sundays but not on working days. It is clear that the number of consultation centres or even clubs without special consultants but provided with television sets should be increased.

3. In reply to the 1970 questionnaire the distribution of reasons preventing or discouraging respondents from watching the lectures was as follows, in percentages:

	Main reason	Additional reason
Lack of television set	14.6	3.1
Professional work	16.6	16.4
Family duties	7.5	10.7
Lectures in higher school	13.2	12.8
Study by other means more effective	3.4	5.0
Technical troubles in reception	0.1	0.8
Too high rate of lecturing	1.7	8.0
Difficulties in understanding the lectures	0.9	2.8
Non-conformity of lectures with curriculum of studies	13.0	28.3

The remaining respondents gave no reasons or reasons which were not specified in the questionnaire. Among them 8.2% gave as the main reason the late hour of the telecasts, 6.2%, lack of time and 5.4% overwork.

Ways of preparing for the lectures and of watching them

4. In the 1970 survey respondents were questioned about what they did before, during and after the television lecture. 17.2% of the respondents did not answer the question because they did not watch the lectures at all. The results, in percentages, were as follows:

	Regularly	Occasionally
Reading appropriate chapter of textbook before lecture	8.2	7.4
Taking detailed notes during lecture	9.5	2.3
Taking brief notes during lecture	32.9	8.9
Recording content of lecture immediately afterwards	0.8	2.3
Reading appropriate chapter of textbook after lecture	13.7	18.3
Not doing any of above	25.1	45.5

Specified forms of activity do not exclude each other and that is why the total percentages, including 17.2% who did not watch the lectures, exceed 100%. The table shows that the larger part of reviewers only observed and listened to the lecture. It is possible that these students benefited more because their attention was not diverted by taking notes or by comparing the lecture with the chapter of the textbook they had just read. Viewers who took brief notes constituted the largest single group. Three comments may be made on the figures. First, students of courses for workers never have much spare time. While they did not read before the lectures, it is possible that they were encouraged and stimulated by the lectures to read afterwards in order to get full understanding of what they had seen and heard. Secondly, there are reasons to suppose that many viewers were not informed beforehand about the exact topic of separate lectures. Thirdly, since the curriculum of the lectures was not fully co-ordinated with the curriculum of studies, and usually the television lectures treated topics before they were treated in classroom lectures, there were students for whom mastering part of the textbook was difficult when the subject has not been explained by a lecturer. These suppositions deserve to be systematically examined.

The problem of the consultation centres

5. In the 1969 survey, the respondents enrolled in the television consultation centres were asked to underline one of the following answers, with the percentage results indicated:

The television lectures would be incomprehensible for me without the assistance of the consultant:	68.5
I did not find the assistance of the consultant necessary:	7.2
The assistance of the consultant was of little help to me:	0.9
The assistance of the consultant was not necessary but, if given, was useful:	23.4

These figures suggest three possibilities: first, that the lectures were really too difficult for the majority of viewers for whom they were intended; secondly, that the viewers were students with great gaps in their knowledge; thirdly, that after the lecture, many consultants gave a talk or put questions and then gave the necessary explanations, so that students who, immediately after the lecture thought that they understood the subject, found that they only really understood it after the talk or explanations given by the consultant. It was unfortunate that the curriculum of the television courses was not synchronized with the curriculum of most of the higher schools. Since the viewers often did not possess knowledge which should have been acquired before in higher school, the consultant had to complete this knowledge and the students could only take real advantage of the television lecture after having listened to the commentary given by the consultant.

6. Since nearly 92% of the participants in consultation centre activities said that the help of the consultants was at least useful, it seems that the network of centres should be developed. In fact, the sparse network of consultation centres was further reduced during the last two years. Consequently, only 1.1% of the persons among the respondents of the second survey watched the lectures in the centres. On the other hand, 2% of the respondents organized private groups for collective viewing. In the first survey 1.7% watched the lectures in the centres and 5.5% with colleagues and friends. It can be supposed that if more centres had been organized in the close neighbourhood of the students' place of living, the majority of persons watching the lectures in groups with their colleagues would have participated in the activities of the consultation centres, where it would have been possible to obtain explanations from the consultants.

Opinions of viewers on the lectures: first survey

7. A list of eleven positive features of the television lectures was presented in the questionnaire and respondents were asked to recall the lectures which they considered to be the best and those they considered to be the worst, and to mark which of these were marked by the positive features listed and which were not. The respondents were also asked to give a general assessment of all the lectures by the same features. For each group of lectures assessed (best lecture, worst lecture, all the lectures in general), there were three options: to give a feature to the lecture or group, not to give that feature but adding that the lack of it had no influence on the quality of a lecture, and not to give it but adding that the lack of it lowered the quality of the lecture. The lack of a given positive feature of a lecture was equivalent to the occurrence of the opposite negative feature, e.g., not giving the feature "clear method of lecturing" to a lecture was equivalent to giving it the feature "intricate and confused method of lecturing". The questionnaire was prepared in the form of a table including eleven rows corresponding to the positive features and three columns, corresponding to a group of the lectures assessed: the best, the worst and all the lectures in general. The respondent put a sign "+", "0" or "-" in every field of a table. The eleven features were as follows:

Clear method of lecturing
Rate of lecturing not too fast
Interesting subject
Clear sequence in presenting themes of the lecture
Interesting presentation of the lecture
Many examples of practical applications
Good presentation of solution of problems
Concordance of symbols with those given in textbooks
Effective use of film clips
Effective presentation of experiments
Synchronization with the curriculum of higher school.

The results of the answers were analysed to determine the number of times each of the features was ascribed to the best and worst lectures and all the lectures in general or not ascribed at all. The answers were also analysed to determine the frequency of mentioning the features in a positive, neutral or negative way, and the frequency of denying the features. Some respondents indicated the occurrence or lack of only some of the features, and one can suppose that only these features were considered to be the most essential. This was taken into account in making further calculations regarding the relative importance attached by viewers to the existence or lack of the features listed.

8. On the basis of these calculations, it is possible to see what importance was attached to the various features by the viewers and to what degree the lectures were characterized by those features. All the respondents gave great importance to "clear method of lecturing", and nearly all the lectures were found to have this feature. "Rate of lecturing not too fast" was the feature considered to be the most important after "clear way of lecturing". It was not as often characteristic of the lectures as the first feature. The lack of it was often decisive in assessing a lecture as particularly unsuccessful. The respondents attached great importance to "clear sequence in presentation of themes". This feature was given regularly only to the best lectures and, generally, it was not characteristic of many lectures. It was included in the group of features which were decisive in assessing a lecture as average or distinguished. "Many examples of practical applications" was found, generally, of moderate importance. The lack of the feature was most often noticed in the case of the worst lectures but was not considered as more harmful than the lack of other features. The syndrome of features of the unsuccessful lecture became visible. It was the lecture of distinctly theoretical character given at too fast a rate, on a subject of little interest and, moreover, as is described below, given ahead of the curriculum of higher school.

9. "Good presentation of solution of problems" was appreciated by the majority of viewers, and was ascribed rather to the best lectures than to all the lectures in general. "Concordance of symbols with those given in textbooks" was a feature to which the majority of viewers attached least importance. If mentioned at all, it was most frequently indicated as a neutral and not harmful feature. "Effective use of film clips" was a feature found more frequently in best lectures than others but viewers did not find the film clips of essential importance to the value of the lecture. "Effective presentation of experiments" was a feature most frequently considered as an advantage of all the lectures in general and of the worst lectures. It was seldom mentioned as an advantage of the best lectures. It seems that it was considered by the viewers as a normal element of the lecture and did not in itself decisively determine the value of the lecture. "Synchronization with the curriculum of higher school" was the feature most frequently mentioned in relation to all the lectures in general. The occurrence of the feature was most seldom observed and the lack of that feature was considered as harmful more frequently than the lack of any other feature. This was also so for the outstanding lectures, the best and the worst ones. There seems no doubt that the sequence and the time-table of lectures on television and in the higher schools should be synchronized and that, especially, preceding the curriculum of higher school by the curriculum of television lectures should not be allowed.

10. What, for the viewer, are the characteristics of the best lecture? It is marked by clear way of lecturing, clear sequence in presentation of themes and interesting ways of presenting them, as well as presentation of solutions of typical problems. Using symbols which do not correspond with those used in textbooks is not considered a fault. Examples of practical applications need not be numerous and the subject itself need not be specially interesting. On the other hand, lack of synchronization of the curricula, as well as too fast a rate of lecturing were faults to be avoided even with the best lectures.

11. The worst lectures were those given too fast and, as with best lectures, those which were not synchronized with the high school curriculum. Examples of practical applications were rarely given, the topics were rarely interesting, the symbols used in them were different from those of the textbooks.

12. Divergencies between the curricula of the television lectures and of higher school, too fast a rate of lecturing, lack of concordance in the use of symbols used, and inadequate presentation of practical applications were above all, the faults found in all the lectures in general and they were considered to be very serious. Less importance was given to the fact that the lectures were not given in an interesting and well-ordered way. The lack of synchronization of the curricula was the most often mentioned fault. Data on this particular subject were closely analysed in relation to students of evening courses and of extra-mural courses. The analyses indicated that the students of extra-mural courses were more concerned about improvement of the television lectures, in this respect, than were students of evening courses. It had been rather expected that the lack of synchronization of the curricula would be of concern, first of all, to the students of evening courses, who are in constant contact with higher schools. The results suggest that a considerable part of the students of evening courses may have considered the television lectures as of marginal aid. It could be supposed, also, that the age of the student and the lapse of time since graduation from secondary school would affect his possibilities of mastering the subjects and, thus, that a young student who graduated from secondary school recently and obtained good results would not have difficulties in mastering the subjects of the television lectures if they preceded those of the high school curriculum while an older student who started adult studies a long time after graduation from secondary school where he only obtained satisfactory marks could be faced with greater difficulties due to the lack of synchronization. Analysis of the data did not confirm this assumption; it seems possible to think that younger viewers did not watch the lectures as attentively as the older ones and hence were less aware of lack of synchronization or concordance.

13. The rate of lecturing was one of the main questions raised. An analysis of the opinions of viewers was carried out in terms of two variables; method of study, and age. The results were as follows:

Method of Study	Percentage of respondents who said that the rate of lecturing was:		
	Correct	Too fast but not harmful	Too fast and harmful
Students of extra-mural courses	37.5	25.0	37.5
Students of evening courses	49.4	31.2	19.5

Age	Percentage of respondents who said that the rate of lecturing was:		
	Correct	Too fast but not harmful	Too fast and harmful
31-40	42.6	22.3	35.1
26-30	44.6	25.0	30.4
21-25	31.0	33.6	35.4

14. To complete the presentation of the more interesting results of the various analyses (only some of which have been presented here) the distribution of viewers' opinions about nine of the features of the lectures is here presented:

	Percentage of respondents who said that the feature					
	Occurred		Did not occur and was not harmful		Did not occur and was harmful	
	Extra-mural courses	Evening courses	Extra-mural courses	Evening courses	Extra-mural courses	Evening courses
Clear method of lecturing	75.5	73.8	17.1	21.2	7.4	5.0
Interesting subject	67.9	76.7	26.6	21.9	5.3	1.4
Clear sequence in presentation of the themes of the lecture	49.4	72.6	31.5	18.5	19.1	8.6
Interesting presentation of the themes of the lecture	56.0	77.5	35.7	19.0	13.0	3.8
Many examples of practical applications	48.0	61.2	26.7	16.8	25.4	20.6
Good presentation of solution of problems	55.4	72.5	21.4	16.2	23.1	11.3
Concordance of symbols with those used in textbooks	42.4	43.8	34.8	34.2	22.9	21.9
Effective use of film clips	76.8	81.3	16.6	10.2	6.6	8.9
Effective demonstration of experiments	79.1	80.6	12.4	11.7	8.7	7.8

On the basis of these data quoted in the table it is possible to draw, among others, the following conclusions:

(a) Students of evening courses appreciated the lectures higher than did students of extra-mural courses in all respects except clear method of lecturing, in which case the difference is small.

(b) Particularly considerable differences (positive opinions were given by students of evening courses more often than by students of extra-mural courses) appear regarding: clear sequence of presentation, interesting presentation of themes and presentation of solutions of problems.

(c) When students of extra-mural courses noticed faults more of them considered them as harmful than was the case with students of evening courses.

It should be recalled that both students of extra-mural courses and of evening courses complained most about the lack of synchronization of the curricula (56.7% and 44.4%), and the rate of lecturing (37.5% and 19.5%).

15. The data and deductions suggest that it would be worthwhile organizing an additional course of lectures intended for the cleverest students of evening courses, who are interested in scientific problems. They would be given in parallel with the main course of lectures which would be exactly synchronized with the higher school course. The additional course of lectures would go deeply into problems of special theoretical and practical importance, especially those relating to the development of modern technology. The course could be expected to attract viewers other than students.

16. The second survey questionnaire included fewer detailed questions related to assessment of the television lectures themselves. The analysis of responses to questions which were contained in both questionnaires showed great similarities. The data, which are very detailed, are not given in this paper.

Opinions of systematic viewers

17. Each systematic viewer was asked whether he thought he had fully understood the whole lecture. Around 90% of them found them fully comprehensible. Systematic viewers who said that they did not understand everything were asked to say what was not clear to them and were questioned on the reasons for their difficulties. Some of the viewers wrote additional remarks on these points. Viewers who complained about difficulties with some lectures on physics found the reason more often than was the case with mathematics in the rate of lecturing and the lack of examples illustrating theoretical material. Much of the difficulty in understanding the lectures on mathematics was due to the lack of synchronization of the curricula. The personal data of the viewers who found difficulties in comprehending the lectures were examined. These were found to be more older people who, moreover, had left secondary school long ago, than among viewers who never complained about difficulties in apprehending the lectures.

18. Another question regarding the degree of comprehensibility of the lectures was put as follows:
"In comparison with other lectures on this subject I estimate this lecture as (underline the proper answer):
exceptionally difficult,
relatively difficult,
ordinarily difficult,
rather easy".

The results, in percentages, were as follows:

	Mathematics	Physics	Descriptive geometry	Technical drawing	In general
Exceptionally difficult	3.8	2.9	1.0	0	2.7
Relative difficult	17.3	13.8	7.7	2.3	12.8
Ordinarily difficult	59.5	48.3	42.8	25.1	48.4
Rather easy	19.5	34.6	48.5	72.6	36.1

19. On the basis of a thorough analysis of the collected material the lectures reviewed were arranged in order according to the degree of difficulty ascribed to them.

Among the observations made were the following:

the range of degree of difficulty ascribed to lectures on physics was evidently wider than was the case with lectures on mathematics,
lectures on mathematics which were full of theoretical problems proved to be more difficult than lectures devoted mainly to calculations,
the lectures on problems of relativity were markedly found the most difficult of the lectures on physics,
lectures on kinematics and dynamics proved to be rather difficult, whereas lectures on the problem of heat were relatively easy,
only two lectures, both on physics, concerning relativity exceeded the middle point of the scale towards "exceptionally difficult",
two lectures on descriptive geometry and most of lectures on technical drawing were found by almost all to be "rather easy".

20. In the second review, the contents of most of the eighteen lectures reviewed were fully comprehensible for 85% to 90% of the systematic reviewers. Five of them presented incomprehensible points to a percentage of viewers ranging from some 20% to 30%. The analytical results obtained in both the reviews indicate that the degree of full understanding of the lectures by systematic viewers was very high, in spite of the general opinion that the lack of co-ordination and synchronization made it difficult to understand the television lectures when they preceded classroom lectures in many higher schools.

The problem of the contents and synchronization of television and higher school lectures

21. The systematic viewers were given the following question:

"The contents of the television lecture (underline the proper answer) were presented

prior to presentation in higher school,
concurrently with presentation in higher school,
after presentation in higher school,
was hardly connected with the material studied in higher school,
no opinion."

The results were as follows:

	In general*	Mathematics	Physics	Descriptive geometry	Technical drawing
Prior to	46.2	49.7	58.9	17.5	12.1
Concurrently with	28.0	33.4	23.7	31.8	27.3
After	16.9	12.4	10.7	33.5	38.6
Hardly connected	6.4	2.8	4.9	11.5	17.3
No opinion	2.5	1.9	1.8	5.7	4.7

(* The percentages weighted with the structure by subjects)

The following conclusions can be drawn:

television lectures clearly tended to precede higher school classes in mathematics and physics,
television lectures on descriptive geometry tended to be later,
television lectures on descriptive geometry and, even more so, lectures on technical drawing received high percentage for "hardly connected with material studies at higher school".

Here are some of the comments made by viewers:

I watch the lectures on mathematics sporadically because they precede the material studied in higher school (105 reviews),
I consider the television lectures on mathematics as a complement to the higher school lectures, and would be very glad if the subjects could coincide (108 reviews),
the rate of the television lectures on mathematics is much faster than that of higher school lectures which is why it is difficult to understand the lectures (133 reviews),

Their opinions can be summarized as follows:

the fact that the television lectures on mathematics usually precede the curricula of the majority of higher schools is harmful rather than useful,
some of the lectures on physics deal with questions which are not comprised in the curricula of higher schools, especially of Higher Engineering Schools,
the lectures on descriptive geometry and technical drawing are hardly connected with the course of studies in higher school,
these phenomena regarding the lectures on physics, descriptive geometry and technical drawing are much less often considered as harmful than the lack of synchronization of the lectures on mathematics.

Opinions of systematic viewers concerning the rate of lecturing

22. Complaints concerning the rate of lecturing had been particularly frequent and insistent. The lecturers and the organizers of the "Television Polytechnic" did not deny that the rate of lecturing was rather fast, but justified it by the need to cover a certain defined amount of material in a 30-minute lecture, which, in fact, was only 26 minutes after deducting introduction, presentation of the subject, etc. But opinions of systematic viewers on this matter contained in the reviews of specific lectures were surprising. The results of the analysis, in percentages, were as follows:

	Much too fast	Rather too fast	Correct	Too slow	No opinion
Mathematics	0.1	18.1	73.6	2.2	6.0
Physics	0.6	16.8	74.6	2.1	5.9
Descriptive geometry	1.0	17.2	69.8	6.8	5.2
Technical drawing	0.3	9.4	76.8	6.7	6.8
On the average	0.4	16.2	74.3	3.1	6.0

It is difficult to estimate to what degree the decrease in complaints about the rate of lecturing is due to actual slowing down of the rate, and to what degree it is due to the higher level of preparation of the present students of first year studies as compared with that of students in previous years. It is probable that those starting studies during recent years were better prepared and could more easily follow the lectures which were delivered at the rate not less, perhaps, than, previously. The young age of the viewers and the fact that they began higher studies soon after leaving secondary school could support that supposition. It is also possible that the level of secondary education, especially in vocational schools, has become higher. Moreover, the large majority of present students are recruited from among graduates from day secondary schools, which give, perhaps, a more thorough education than do the evening schools and extra-mural and correspondence schools. The questionnaire forms contained a final column for general remarks. It happened very frequently that the viewers used this column to state once more and stress opinions expressed in other columns. The problem of the rate of lecturing did not often appear in the final column. Nevertheless, the remarks of the viewers on the rate of lecturing indicated a conflict between the lecturers and the students. The lecturers handled too quickly the many examples used to illustrate the application of formulas, because they considered them a secondary element, whereas the students of courses for workers considered the examples as of primary importance.

Viewers' positions on certain didactic questions

23. The distribution of the opinions concerning the lack of certain didactic elements in the lectures in general and on particular subjects was as follows:

	Lack of examples	Lack of solutions of problems	Lack of experiments	Lack of showing practical applications	Other lacks	Nothing lacking
In general	15.2	17.3	5.9	9.8	3.8	50.1
Mathematics	17.8	32.8	0.1	5.5	4.5	41.9
Physics	11.0	11.0	12.9	13.4	2.4	52.0
Descriptive geometry	12.0	18.8	0	5.5	2.2	61.5
Technical drawing	23.5	1.6	0	10.1	7.0	57.8

(Note: The aggregate of the rows exceeds 100% because some of the viewers sometimes underlined two or more answers to the questions.)

The following observations arise from examination of this table:

half of the reviewers did not find any lacks in the lectures,
lacks were referred to less often in lectures on descriptive geometry and technical drawing, and most frequently in lectures on mathematics,
more than half of all complaints about the lectures on mathematics referred to the too small number of problems solved.

It seems that a lecturer met the expectations of students when he gave many examples and numerous illustrations; when he showed methods of solving problems, and not artificially simplified ones, but ones which were of a degree of complexity that might be really encountered; when in the course of a lecture, especially in the course of proving a theorem, he did not refer to operations or formulae unknown to or forgotten by the students without precise explanations; and, finally, when he spoke or wrote on the blackboard slowly enough for students to take notes without losing the thread of the lecture. The viewers of the lectures on technical drawing evidently approved the innovative method of lectures given by a group of specialists. They appreciated the attractiveness and liveliness of these lectures and the efforts of the lecturers to bring out the practical applications of the subject presented. The lectures on descriptive geometry seem to have been generally assessed positively. The participants in the second survey, in their opinions on the lectures on mathematics, complained about the small number of problems solved during a lecture. It is clearly difficult to present and solve many problems during a lecture of less than thirty minutes. Nevertheless, the students decidely asked that lecturers devote more time to this. It is interesting that the viewers of the lectures on physics also asked more frequently for an increased number of problems solved than for more experiments. Many of the viewers of the lectures on physics also asked for more presentation of the practical applications of theoretical principles. The viewers of the lectures on technical drawing asked, first of all, for more lectures and they wanted more about the practical application of material presented in the lectures.

Opinions of viewers regarding the physical and technical presentation of lectures

24. Observations made in former academic years had suggested that in spite of the high technical quality of reception, viewers sometimes had troubles in watching the lectures because e.g. formulae shown were hardly legible because they were written in small letters or incorrectly lit, or because the lecturer obstructed them when moving before the camera. The reviewers were asked to give information on faults of this kind which affected their opinions about the lectures. Analysis of the replies indicated that 86.2% of the viewers had no such troubles and could easily see everything on the television screen. There were some variations as between the various subjects and between types of material presented - written material, illustrations, experiments, etc. - but in no case did the difficulty seem to have been really serious.

Technical conditions of reception

25. The distribution of the answers to the question regarding technical conditions of reception, sound and vision, were as follows, in percentages weighted only within the structure by subjects.

		Mathematics	Physics	Descriptive geometry	Technical drawing	In general
Good	sound	78.6	80.9	84.5	83.2	80.7
	vision	63.5	68.5	68.2	71.3	67.3
Fair	sound	19.9	17.4	14.5	15.8	17.8
	vision	33.2	30.0	29.8	24.7	30.2
Poor	sound	1.5	1.7	1.0	1.0	1.0
	vision	3.3	1.5	2.0	4.0	2.5

It can be seen that viewers seldom had technical troubles in the reception of the television lectures.

Opinions of viewers about the value of the lectures

26. The viewers were asked to give their opinion on the value to them of the television lectures in accordance with a five degree scale. They were asked to assess the lectures on mathematics and physics and if the degree of value for both was the same, to assess the lectures on the two subjects together. About 90% of the respondents decided to assess both together.

The results, in percentages, were as follows:

	Essential help	Significant help	Some help	Little help	No help
Mathematics	1.3	10.2	57.6	28.0	2.6
Physics	1.3	12.0	57.0	27.4	2.4

It was estimated that, in general, students of extra-mural and evening courses alike considered the lectures as helpful but did not overestimate their significance. The same question above was answered by various respondents and people who were not systematic viewers. The results, in percentages, of the analysis of opinions according to the respondents' method of study are given below.

	Did not watch	Essential help	Significant help	Some help	Little help	No help	No answer
Extra-mural courses	11.1	0.9	8.2	42.0	22.9	2.1	12.8
Evening courses	31.3	0.4	6.0	34.2	10.4	1.2	16.5

The comparison of the data concerning the proportions of the students of extra-mural and evening courses not watching the television lectures and the corresponding values of average indicators of usefulness of the lectures may seem surprising. The following hypotheses suggest themselves. It is known that students of evening courses watched the television lectures less than students of extra-mural courses. Students of evening courses were able to attend lectures in higher school and, as compared with students of extra-mural courses, their demand for direct contact with a lecturer was basically satisfied. Nevertheless, quite a large group of students of evening courses watched the television lectures and even did so systematically. They probably appreciated the lectures because otherwise they would only have attended lectures in higher school. Consequently, when students of evening courses watched the lectures, it is supposed that they would appraise their value higher than the average student of extra-mural courses who watched the lectures for lack of other possibilities of seeing the lecturer. A further attempt was made to analyse the opinions of participants at the television consultation centres on the usefulness of the lectures, but the material collected was poor.

27. In the second survey questionnaire, respondents were asked "Did you happen to be asked at the examination a question concerning material you remembered thanks to the television lectures?". The results were: "No", 43.5%; "Yes, on descriptive geometry", 7.1%; "Yes, on mathematics", 25%; "Yes, on chemistry", 1.3%; "Yes, on physics", 5%; "Yes, on technical drawing", 0.5%; No answer, 19%. In reply to a further question whether the viewers concerned thought that they would have obtained worse results at the examination if they had not watched the television lectures, the results were: "I think that the results would have been worse", 31.8%; "I do not know", 17%; "I think that the results would not have been worse' 3.2%. The distribution of answers to the general question on the usefulness of the television lectures was as follows:

"The lectures were not helpful to me, because I watched them very seldom", 45.6%;
"The lectures were of little help to me, in spite of the fact that I watched them frequently", 3.2%;
"The lectures made my studies somewhat easier", 31.8%;
"The lectures made my studies much easier", 2.7%.
The question was not answered by 17% of the respondents.

Viewers' opinions regarding the organization of the "Television Polytechnic"

28. Of the respondents covered by the second survey questionnaire 32.1% watched only the lectures telecast in the evening; a further 16.4% usually watched these telecasts, and 15% often watched them. On the other hand, only 6.3% of the respondents watched only the lectures telecast in the afternoon, and 9.5% usually watched them. The rest, apart from 0.4% of the respondents who watched both afternoon and evening telecasts, did not watch the lectures at all. Thus, the majority of the viewers watched the evening telecasts. Complaints about the late time of repeating lectures in the evening were the most numerous and more numerous than all other critical comments. The majority of the respondents wished the evening repetition to begin between 9 p.m., and 10 p.m. Many of the viewers, however, did not make definite suggestions, but only stated that lectures at such a late time were of little use. It can be supposed that those who asked that the evening telecasts should be somewhat earlier but said nothing about the time of telecasting

the afternoon lectures, did not watch them and were resigned to the fact that the afternoon lectures were unavailable for them and, therefore, did not even try to ask for any changes in the hours of telecasting them. It is probable, however, that if the afternoon lectures could be telecast somewhat later, a large group of those students would watch them. This applies above all, to extra-mural students, since many students of evening courses attend university lectures in the afternoon and therefore no afternoon hour would suit them. Many students of extra-mural courses asked for precise changes in the time of telecasting afternoon lectures. And their requests were reasonable: nobody wanted the lectures to begin later than 4.30 p.m., and many would be satisfied if the lectures began at 4.00 p.m., or even 3.50 p.m. The actual time, 3.30 p.m., proved to be definitely inconvenient, because the majority of the students did not finish work before 3.00 p.m. Supposing that in the future the television lectures were intended, first of all, for students of extra-mural courses, the request for a change of time of telecasting afternoon lectures becomes more important than that concerning evening lectures. If the lectures were intended for students of evening courses, as well as for students of extra-mural courses, it would be primarily important to change the time of telecasting repetitions. Among the students' other remarks referring to these questions, there were many criticisms of unexpected delays in the telecasts, which were anyhow late in the evening. One such example was: "For the sake of the working student's valuable time, the time of telecasting the lectures should be strictly respected. I think that nothing should defer the telecasting of the 'Television Polytechnic' lectures, and if this happens, the change should be widely announced." 177 viewers made comments to this effect. Many of those who complained about the lack of presentation of solution of problems during the lecture made proposals which, if carried into effect, would satisfy students' needs. There were many proposals to the effect that every Sunday morning, or every second Sunday morning, the "Television Polytechnic" should organize classes devoted only to the solution of problems in both mathematics and physics. Some viewers proposed, alternatively, Saturday afternoons, e.g. about 2 p.m. Some of the viewers introduced more general proposals, e.g. to produce a complementary programme: "Solving problems in physics". Others suggested that the lecture units should be prolonged from 30 minutes to 40, or even 45 minutes, in order to give time for presenting the solution of complicated problems. Others wanted the lecturers to dictate several problems to be solved individually, the answers to which would be given in the following telecast.

29. Lectures by different lecturers were much criticized. More radical was the demand that all the lectures on one subject should be given by one person. One viewer said: "I do not like the continual changes of the lecturers of physics, and of other subjects. There are better and worse lecturers. Changes of lecturers, however, makes learning more difficult. Every lecturer has his own way of giving the lecture and students adjust themselves to it". Similar views were expressed by 72 viewers. On the other hand, a number of viewers approved of lectures on technical drawing being given by the team of three persons. There was, here, a difference of opinion between the organizers of the "Television Polytechnic" and, at least, a part of the viewers of the lectures. The organizers wanted to give students the opportunity of becoming acquainted with many very distinguished specialists, and probably also to show them various possible approaches to different problems whereas viewers wanted to stick to one method and one style.

30. The foregoing information is complemented by data concerning complaints and requests derived from the second survey questionnaire which referred to the later activities of the "Television Polytechnic". Respondents expressed various positions and requests which could be arranged in 17 groups. Views relating to seven of these groups expressed by at least 5% of the respondents were as follows:

evening telecasts should begin earlier - 18%,
divergencies between curricula of the "Television Polytechnic" lectures and the lectures given in higher school are undesirable - 13.7%,
afternoon telecasts should begin later - 12.9%
the time of the telecasts is generally unsuitable - 10.9%,
the rate of delivering the lectures is too fast - 9.5%,
the presentation of examples should be increased and improved - 8.6%,
it would be good to repeat telecasts on Sunday mornings - 5.6%.

43% of the respondents did not make any critical remarks or requests. This could be due to their not having any criticisms or requests to make or to lack of interest in the questions regarding the problems of television lectures.

31. It will be seen that critical remarks referring to the length of the telecasts and demands for changing the hours of the telecasts predominate in the views expressed by viewers. With the inauguration of a second television channel, it has become more possible to respond to these requests.

12. EFFECTIVENESS OF THE LECTURES FOR THE FIRST YEAR OF STUDIES

Ewa Świerzbowska-Kowalik

The sources of information examined

1. In the second year of the "Television Polytechnic" activity, the team of the Inter-University Institute for Research on Higher Education undertook research aimed at defining the effectivness of the lectures as an aid to students of the first year of studies. It was decided to use two sources of material: questionnaires filled in by students and information cards about students received from higher schools. The questionnaires were sent to students in two versions: the first was intended for students who had passed the examinations of the first year of studies and gone on to second-year studies, and the second for the students who had not succeeded in passing the first-year examinations and left higher school. The main part of the questionnaire (common for both the groups) concerned assessment of the lectures and included questions about frequency of watching the lectures and reasons for not watching them. All the respondents were also asked questions concerning their opinions on the significance of the lectures of the preparatory course in the decision to start higher technical studies and in preparing for the entrance examination. In the first questionnaire for students who left higher school there were questions about the reasons for their leaving and about their further plans. Questionnaires were sent to all viewers who had been studying in the academic year 1966/1967. The percentage of replies received from viewers who were still studying was higher than that of replies received from those who, for different reasons, had left higher school. The second source of material were the cards on students filled in by the Dean's offices of higher schools which gave information, demographic and professional data and marks obtained, about the students studying in second year at the time of the research operation and about persons who had left higher school during or at the end of the first year of studies. Material coming from these two sources provided the basis for comparisons concerning frequency of watching the lectures, opinions about them and results obtained by the respondents. Data from both sources were available on 1,603 students who had passed the first-year examinations and on 1,302 students who had left higher school. The questionnaire sent to all worker students who in the academic year 1966/1967 studied in technical universities and higher engineering schools dealt mainly with the television lectures. It must be taken into account that the completed questionnaires came from these people rather than from general viewers interested in the lectures. In generalizing information concerning the respondents to the questionnaires and transferring them to the total student population of the first year of technical studies for workers, it must be realized that the frequency of watching the lectures and the influence of the lectures on taking the decision to start studies could be less for the total student population than for the respondents to the questionnaires.

Characteristics of the population examined

2. Among the respondents there were some 75% who passed the examinations of the first year of studies and 25% who left higher school during or at the end of the first year of studies. Information cards sent in by higher schools covered 68.6% of students of the first semester of the second year and 31.6% of people who had left higher school. This shows that the questionnaire was more often answered by students who were more interested in studies and in the lectures. Among the students of the first semester of the second year, there were 31.3% of extra-mural students and 64.6% of students of evening courses. The corresponding percentages for the group of those who had left higher schools were 43.4% and 53.7%. The respondents represented all the technical higher schools. The overwhelming majority of the population examined were men; the percentage of women in both groups of respondents did not exceed 10%. The distribution by age of the respondents did not differ substantially from that of the persons for whom information cards were received from higher schools. The largest group among the respondents was formed of people who had taken up studies in evening courses immediately after graduating from secondary school or, at least, as early as it was possible, as a two-year period of service between graduating from secondary day school and starting studies for workers is compulsory in Poland, and only graduates from secondary school for workers can start studies for workers immediately after the secondary school final examination. Among the students of the first semester of the second year there were 56.4% who started studies within four years of graduating; among those who had left the percentage was 59%. Graduates from secondary day schools constituted the majority of the respondents, and the same was so for the total viewer population. More than 3/4 of the respondents of both groups graduated from secondary vocational schools. Thanks to information received from higher schools, data were collected regarding the level of knowledge and skill of the respondents; marks obtained at secondary school final examinations and entrance examinations to higher schools were taken into consideration. Respondents who got satisfactory marks at both these examinations in mathematics and physics constituted the majority in both groups. Most of the respondents were employed in industry and building,

and most occupied positions for which secondary education was required. Half or more of the respondents in both groups came from towns of more than 100,000 inhabitants. There were only around 9% of respondents living in villages and small towns. Nearly half of the respondents in both groups came from towns in which technical higher schools were located.

Effectiveness of the television lectures

3. There are several elements contributing to the effectiveness of the lectures:

(a) conditions and frequency of viewing;
(b) the way of viewing;
(c) the subjective attitude of the viewer, i.e. the conviction that the lectures are helpful and necessary for him and come up to his expectations;
(d) methodological correctness of the lectures.

4. The basic condition is regular viewing. Only systematic watching makes the lectures of real help to the viewers. All the information obtained through the analysis of the data included in the questionnaires discussed above and in other questionnaires used during the course of research confirm this. The following types of obstacle to systematic viewing were selected:

(a) Inconvenient time of telecasts.
(b) Lack of a television set or accessibility to one, and living in a part of the country where reception from some television centres is disturbed.
(c) Lack of proper co-ordination, synchronization and collaboration between the higher schools and the "Television Polytechnic" operation.
(d) Low estimation of the usefulness of the lectures to the respondent's studies.
(e) Other reasons.

Results of the analysis of data were as follows:

	Decisive reason						Secondary reason					
	a	b	c	d	e	None given	a	b	c	d	e	None given
Students promoted to the second year of studies:												
Total	18.0	16.2	36.9	9.0	1.8	22.4	24.5	4.7	52.2	21.8	6.8	32.0
Extra-mural courses	23.0	13.0	29.1	8.3	1.6	26.4	23.7	6.0	47.1	23.9	7.2	37.1
Evening courses	15.5	20.6	40.7	9.5	1.8	20.5	24.6	4.0	55.2	20.6	6.7	29.2
Students having left higher school:												
Total	24.8	16.3	21.3	8.2	1.6	29.8	26.6	7.1	34.3	20.7	5.2	40.9
Extra-mural courses	27.7	13.2	20.8	8.4	2.0	29.7	28.4	9.6	35.8	24.8	4.0	36.8
Evening courses	23.7	18.8	21.8	8.0	1.8	20.5	24.6	5.1	34.1	18.5	6.5	42.8

(Percentages sometimes exceed 100% because respondents gave more than one reason.)

The results indicate that the reasons most frequently given related to the lack of co-ordination between higher schools and the "Television Polytechnic". Among decisive reasons, few respondents gave dissatisfaction with the lectures or assessed the lectures as not useful. The answers indicate clearly that the effectiveness of the lectures depends to a high degree on organized facilities for viewers which should be created by the "Television Polytechnic" and higher technical schools together. On the other hand, getting real benefit from the lectures depends also on the way of watching them. Not all the viewers were adequately prepared to make fully effective use of teaching by television. They did not know how to adjust their methods of learning so as

to assimilate the contents of the lectures. Proper preparation is still more important when you consider that many viewers took up studies after a long break and that the lectures were intended for the students of the first two years of studies, i.e. for people who had not yet elaborated their own methods of study.

The rôle of the lectures in examination proficiency

5. Two important questions are:

(a) To what degree, if any, did viewing the lectures affect the course of studies in the case of worker students?
(b) To what degree, if any, did the success in studies depend on systematic viewing?

As far as the first question is concerned, information about the marks at examinations received from higher schools and information concerning frequency of viewing during the first year of studies were compared. Information collected about the respondents who passed the first-year examination was more complete in comparison with that concerning the respondents who dropped out of studies. It is very often difficult to define whether failure in the examination results from the fact that the person stopped attending the higher school early in the semester and, consequently, did not take examinations or attended all the classes but at the last moment did not take the examination. Therefore, detailed tables will only be given relating marks got during the first year of studies to frequency of viewing for respondents who successfully passed the examinations at the end of the first year of studies. It should be realized that the validity of conclusions about the effectiveness of the lectures on the basis only of these two factors must be limited, since it was not possible to eliminate or define precisely the significance of many other factors which can affect results in studies, such as age, the length of period between graduating from secondary school and entering higher school, learning conditions at home, family and professional duties and, above all, intellectual abilities.

6. In the following tables the marks are indicated thus:

(a) Excellent mark.
(b) Good mark.
(c) Satisfactory mark.
(d) Unsatisfactory mark changed to satisfactory mark at the repeat examination.
(e) Unsatisfactory mark changed to good or excellent at the repeat examination.

MATHEMATICS: first semester

Lectures were viewed:	Marks in examination				
	a	b	c	d	e
Systematically	4.0	17.0	63.3	14.8	-
Approximately every second lecture	2.7	18.4	62.7	14.7	-
Only a few	3.6	20.9	58.8	14.3	0.6
Not at all	4.7	16.9	62.1	13.8	0.3

MATHEMATICS: second semester

Lectures were viewed:	Marks in examination				
	a	b	c	d	e
Systematically	2.8	16.8	64.2	14.7	1.1
Approximately every second lecture	4.3	22.4	51.9	18.1	0.5
Only a few	4.0	19.3	56.3	18.0	0.9
Not at all	5.6	17.0	58.3	15.7	6

PHYSICS

Lectures were viewed:	Marks in examination				
	a	b	c	d	e
Systematically	3.6	24.3	45.6	9.5	0.6
Approximately every second lecture	2.3	13.9	51.2	8.3	0.7
Only a few	2.6	14.6	44.6	6.3	1.0
Not at all	3.6	15.6	42.7	3.0	-

DESCRIPTIVE GEOMETRY

Lectures were viewed:	Marks in examination				
	a	b	c	d	e
Systematically	5.1	17.8	58.7	9.8	-
Approximately every second lecture	5.3	16.1	64.9	6.3	-
Only a few	5.1	25.0	53.3	6.4	0.4
Not at all	6.2	18.8	50.0	5.8	-

CHEMISTRY

Lectures were viewed:	Marks in examination				
	a	b	c	d	e
Systematically	6.4	18.3	46.8	5.5	0.9
Approximately every second lecture	4.3	19.6	42.1	7.7	1.0
Only a few	3.1	18.8	48.1	3.5	0.2
Not at all	4.8	18.8	44.0	5.1	0.2

7. These tables are not indicative of the existence of a real statistical interdependence between systematic viewing and getting good marks in examinations on the first year of studies. Systematic viewers had better results in studies than their colleagues in exceptional cases only and this was certainly caused by a number of factors which influence getting good marks at examinations. It is necessary to try to define the elements, besides watching the lectures, which affect the process of study and contribute to success in studies or make it difficult. Passing all the examinations and final tests which permit continuing studies in the second year is the accepted criterion for success in studies. Further comparisons showed a distribution of success in studies in terms of a number of variables which, it was supposed, contribute to success in first-year studies. One hypothesis based on earlier phases of the research was that the level of knowledge which viewers possessed when starting the first year of studies was one factor contributing to successful studies. The marks for mathematics and physics in entrance examinations to higher schools can indicate this level of knowledge. In the case of respondents for whom there was a long period between graduating from secondary school and taking entrance examination to higher school, marks got at secondary school final examinations indicate, but to a lesser degree, this level of knowledge. It was found, in fact, that all the respondents who had had excellent marks for mathematics in the entrance examinations passed the first-year examinations;

of those with good marks 86.6% passed, of those with satisfactory marks 74.1% passed and of those with unsatisfactory marks 43.2% failed and had to leave higher school. Similarly, 90% of the respondents who had excellent markes in physics passed the examinations, and 10% of them left higher school, and of those who had unsatisfactory marks 45.9% failed.

8. It can also be stated on the basis of the research that there existed certain convergencies between the level of knowledge of the respondents at the moment of starting studies and combining studies on the first year with the television lectures. It was also found that students who had excellent marks at entrance examinations more often had given up watching the lectures and watched them less systematically than the students who had worse marks.

9. As for length of period between graduating from secondary school and starting studies, it was found that the longer the period was the less were the chances to succeed in studies. The long break in learning seems to lead the students to look for different forms of help in their studies. This seems to be shown by the following table on frequency of viewing the lectures on mathematics in the first semester by groups of respondents which differed from one another in the length of period between graduating from secondary school and starting studies. Studies in relation to other subjects showed the same tendencies.

Graduated from secondary school in the years:	N=100%	Frequency of watching the lectures			
		Systematically	Every second lecture	Only a few lectures	Not at all
Students who passed the first-year examinations:					
1953 and earlier	158	37.3	27.2	20.3	12.0
1954-1957	249	26.9	25.7	28.5	15.3
1958-1961	273	19.4	28.5	31.1	18.3
1962-1964	429	16.1	25.9	33.1	32.5
1965-1966	474	20.1	22.1	32.5	21.1
Students who failed:					
1953 and earlier	43	34.9	32.8	25.0	4.7
1954-1957	59	32.2	27.1	27.1	1.6
1958-1961	64	25.0	23.4	35.0	9.4
1962-1964	161	19.3	24.8	43.5	6.8
1965-1966	135	16.3	27.4	43.7	4.4

(The percentages do not total 100% because no replies are not taken into account.)

As the period between graduation and starting higher studies gets longer, the frequency of viewing increases and the group of respondents who gives up viewing decreases.

10. The attitude of enterprises towards studies by their employees attending courses for workers was an essential factor affecting the possibility of success in the course of studies. The students for whom their enterprises provided facilities for study were far more successful in passing examinations and less of them

gave up studies during the first year. One of the most important forms of help from enterprises was the organization of television consultation centres or assistance to higher schools in organizing them. However, only a small percentage of the respondents - 10.7% of the total - participated in these consultation centres, and 2.6% in enterprises' clubrooms. The frequency of viewing by the participants in the consultation centres was considerably higher than that of individual viewers. Among viewers of the lectures on all the subjects, the percentage of systematic viewers among the participants in the consultation centres was several times higher than that of systematic viewers among those viewing the lectures individually.

11. The time taken to get to the higher school was another important element which affected the regularity of students' contacts with the higher school and their possibilities of individual study. However, in studying the influence of the distance from higher school on the time devoted by respondents to watching the lectures, it was found that the frequency of viewing increased with growing distance from the higher school. Lectures on mathematics in the first semester were watched systematically by 21.6% of the viewers whom it took less than 30 minutes to get to the higher school, 10.7% of the viewers whom it took from 30 minutes to 1 hour, 23.9% of the viewers whom it took more than 1 hour and 27.2% whom it took more than two hours. It seems that this is to be explained by a fact which has been already mentioned, namely, that among the students whom it took more time to get to the higher school there were more extra-mural students. It is known that they looked for the help of the television lectures more than did the students of evening courses. On the other hand, students of evening courses who lived far away from the higher school had to miss lectures more often than their colleagues living near the higher school, which led them to turn to the television lectures for help in their studies.

12. This information on relation between the success in studies and certain variables does not always give basic statistical facts, but suggests certain trends. The respondents who were better prepared to take up studies, who were living not too far from the higher school, who were among the younger students, who were employees meeting with a favourable attitude on the part of their enterprises and graduates from day secondary schools more often succeeded in studies. On the basis of examination of the data regarding frequency of viewing by different groups of students of courses for workers and success in studies of the same groups, it is possible to say that the lack of evident effects of watching the television lectures can be explained as follows:

the lectures were more viewed by elderly students, students who had a long break between graduating from secondary school and starting studies, and, at the same time, these students succeeded less in studies;
the lectures were more viewed by students whose knowledge at the moment of starting studies (indicated by the results at entrance examination) was lesser, and again were students who succeeded less often in studies;
the lectures were more watched by students who, because of distance from home to the higher school and work, could devote less time to studying, and these students succeeded less in studies.

Thus, among the groups of systematic viewers, there were more persons whose chances to succeed in studies were less, because of other factors interfering with studies, than was the case with the remaining respondents. This fact determined in a large measure the results in studies obtained by the group as a whole. On the other hand, it can be considered that the group recruited mainly from among the respondents with less chances to succeed in studies but watching the lectures systematically, did not obtain worse results than other groups. Therefore, the hypothesis can be maintained that this was due to the help of the "Television Polytechnic" lectures. An important purpose of the lectures is to level differences between students of technical studies for workers who were worse or better prepared for studies. The "Television Polytechnic" helped a large group of viewers in their studies and made possible their adaptation to new circumstances and requirements in the first stage of study in higher school.

13. The results of the research in the academic year 1966/1967 have shown that it is possible to strengthen the influence and help of television for student viewers by several steps which would increase the "organizational effectiveness" of the lectures. Preparatory courses should be organized which would contribute in great measure to evening-up differences in the level of knowledge by the viewers at the moment of starting studies. The next organizational step, which would, no doubt, increase the effectiveness of the lectures, would be to continue the activities of the television consultation centres for collective viewing and for providing supplementary explanations by the consultants. The lectures should be accompanied by the issuing of proper sets of information books, manuals, etc. Each cycle of "Television Polytechnic" lectures should be preceded by lectures to inform future viewers not only about the programme but also about the proper way of watching the lectures. Finally, the most important step needed to increase the "organizational effectiveness" of the "Television Polytechnic", and thus, influence its didactic effectiveness, is to achieve full agreement between the television authorities and the higher schools in the creation of an integrated system and programme of television lectures for higher technical schools.

13. TELEVISION LECTURES FOR THE SECOND YEAR OF STUDIES

Barbara Majewska-Radźko

1. Telecasting of lectures for the students of the second year was started for the first time in the academic year 1967-1968. It was the only course of such lectures and was not repeated. Since there is only one television channel covering the whole country, the television authorities could assign only a short time for television lectures. The organizers of the "Television Polytechnic" felt obliged to abandon courses of lectures for the second year of studies in favour of preparatory courses and the courses for the first year of studies.

2. The lectures for the second year of studies totalled 180 lecture units as follows:

	First semester	Second semester	In total
Mathematics	54	-	54
Physics	36	27	63
Mechanics of material	-	27	27
Electrotechnics	-	36	36
Totals	90	90	180

3. The aim of the research was to examine the social incidence of the lectures, the way and frequency of watching them, and methods of preparing viewers to watch them. An important objective was to assess the influence of the television consultation centres on regularity of watching the lectures. An analysis was made of obstacles to watching the lectures.

4. Data on 5,580 students of the first semester of the second year of studies were obtained from the technical higher schools running evening and extra-mural courses for workers in November and December 1967. The data concerned results obtained at the secondary school final examinations and the entrance examinations, as well as the results of the final tests and examinations passed during the first and the second semester of the first year of studies 1966-1967. To collect materials for investigation into different pedagogical and sociological problems, these students were sent questionnaires. The list of students used in February 1969 referred to students who were in the second year of studies 1967-1968 and should have gone on to the third year of studies. The number of answers received amounted to 1982, i.e. 36%.

Social and demographic characteristics of viewers of television lectures for the second year of studies

5. Of the respondents, 58.8% were students of evening courses and 40.3% were students of extra-mural courses. The questionnaires were sent to respondents who came from 17 higher schools. However, over 42% of these respondents came from three of these. 80.5% of the respondents were students of technical universities and 18% of them studied in higher engineering schools. The questionnaires were addressed to students of the third year of studies or people who were supposed to be in that year of study at the moment of receiving the questionnaire. It turned out that 83.7% of the respondents were actually students of the third year and 11.8% were students who, for different reasons, were to repeat the second year of studies. Men constituted 92.3% of the respondents which corresponded approximately to the percentage of male students of technical studies for workers in 1967-1968. Employees of production enterprises, including building and transport, formed 78% of the respondents, 53% of them were employed in industrial enterprises. 22% of the respondents held executive posts such as foreman and upwards, and 0.5% of the respondents held posts as managers and chief engineers; 4.5% were school teachers and instructors; 40.8% of the respondents were persons occupying independent posts as work-study technicians or designing or technology technicians. 15.2% of the respondents said that higher education was a condition required for their actual professional positions, for 35% of the respondents higher education was said to be desirable, 46% held positions for which secondary education was necessary, and 6.2% of persons performed work for which even full secondary education was not required. 30.2% of the respondents stated that the enterprises in which they were employed really helped them in studies; 61.1% said that the attitude of the enterprises towards their studies was neutral, and 4.9% stated that they met obstacles to the course of studies with their enterprises.

The regularity of watching the lectures

6. Data obtained concerning regularity of viewing were as follows:

	Did not watch	Only some lectures	Approx. every second lecture	System-atically
Mathematics	44.3	27.8	14.3	11.8
Physics	53.8	23.5	12.5	8.3
Electrotechnics	85.3	7.7	2.4	2.7
Mechanics of materials	83.9	7.9	3.0	3.3

(Percentages do not always aggregate 100 because of the lack of answers.)

The fact that the overwhelming majority did not watch at all the lectures on electrotechnics and mechanics of materials is surely because these are optional subjects. But the high percentage of people who did not watch at all the lectures on physics, and the low percentage who watched them systematically should be a matter of concern. Systematic viewers and a few of the viewers who watched, at least, every second lecture suddenly stopped watching the lectures. Those who gave up watching the lectures did so because they stopped studies. But some respondents did not stop watching the television lectures in spite of stopping studies because they wanted to be up to date; were attracted by the lectures or found that the knowledge mastered thanks to the lectures was useful in their professional work.

Conditions making it difficult to watch lectures

7. In the table below, column 1 gives the percentage of all respondents who gave the reason as the main reason for missing the lectures or watching them only sporadically. Column 2 gives the percentage of that group of respondents who did not watch the television lectures or watched them irregularly. Column 3 gives the percentage of those giving the reason not as the main one but as a marginal reason.

	1	2	3
Technical disturbances in reception	0.4	0.6	0.9
Too great rate of lecturing	1.1	1.9	7.4
Unintelligible form of lecture	0.8	1.4	4.2
Lack of synchronization with curricula of higher school classes	14.3	24.3	25.4
Lack of a television set	11.4	19.3	5.2
Conflict of time of telecasting with professional work	8.7	14.7	13.3
Inconvenient time of telecast in relation to family duties	5.4	19.2	10.2
Conflict of time of telecast with higher school classes	14.0	23.7	17.1
Availability of other forms of study making telecasts pointless	6.0	10.1	7.5

These data suggest that the low viewing of the television lectures was mainly due to three reasons: (a) unsuitable time of the telecast; (b) lack of synchronization of the television lectures with the themes of classes in higher schools; (c) lack of a television set.

Study activities undertaken in relation to the lectures

8. The majority of the persons watching the lectures systematically or from time to time undertook activities to help them take good advantage of the lectures. The percentages within the majority group for the various activities practised systematically and occasionally were as follows:

	Systematically	Occasionally
Reading chapter of textbook before the lecture	10.5	11.7
Taking detailed notes during lecture	9.1	3.8
Taking notes on most important parts of lecture	40.4	14.7
Making report notes immediately after lecture	2.2	2.3
Reading chapter of textbook after lecture	20.4	21.7

Usefulness of the lectures

9. All the respondents were asked "Did it happen to you at the examination that you were asked questions concerning material you remembered from the television lectures?" 58.4% of them answered "No", and the 16.9% who did not answer the question should probably be considered as "No". 24.7% of the respondents answered "Yes". In reply to another question 13.4% of the respondents said that they would have obtained worse results at the examinations in certain subjects if they had not watched the lectures.

10. Among respondents who watched the lectures or had at least seen some of them 56.2% said that the lectures had been of no value to them because they had watched so few and 5.7% said that they had been of no value although they had watched many; 31.6% said that the lectures had made studies easier and 2.7% that they had made them much easier. Excluding those who did not answer the question or rarely watched the lectures, the distribution of opinions of the rest was:

the lectures were not helpful - 12.1%
the lectures made studies easier - 81.0%
the lectures made studies much easier - 6.9%

Consequently, it is seen that the lectures for the second year of studies were of help to only a minority but they were helpful for nearly all the students who watched them often enough. 10.3% of the respondents watched systematically the lectures on mathematics, 7.1% those on physics, 2.6% on electrotechnics, and 3.0% those on mechanics of materials. Among the systematic viewers some 65 to 73%, according to the subject, said that the lectures made studies of that subject easier and some 15 to 20% that they made much easier. It is worthwhile mentioning that the question whether respondents were asked questions at the examination concerning material which they knew thanks to the lectures, was answered positively as regards mathematics by 15.6%, as regards physics by 11.4%, electrotechnics 2.4% and mechanics of materials 1.9%. A striking difference appeared when systematic viewers only were considered. As regards mathematics 51.2% of the systematic viewers answered the question positively, for physics the percentage was 53.2%, and for electrotechnics and mechanics of materials the percentages were 46.2% and 35%.

11. Other information obtained from analysis of the replies suggests that systematic viewers were likely to be asked examination questions concerning material treated in the television lectures and that most of these passed the examination; failures were only 5.8% in mathematics, 8.7% in physics, 4.8% in electronics and none in mechanics of materials whereas failures among those who did not watch any lectures ranged from 70% to 90% in the different subjects.

12. In the following table data is represented in relation to groups of students of different specializations. Column 1 shows percentage of those who seldom watched or did not watch at all. Column 2 is percentage of systematic viewers of lectures on one subject at least. Column 3 is percentage of systematic viewers watching of lectures on all four subjects. Column 4 is percentage of those who were not questioned on material known to them from the lectures. Column 5 gives percentage of those who said that the lectures made their studies easier. Column 6 gives the percentage of those who said that, if they had not watched the lectures they would have obtained worse results in the examinations.

	1	2	3	4	5	6
Civil engineering	63.8	13.8	0.8	58.3	25.1	17.3
Mechanics	65.6	15.2	2.1	55.9	29.3	13.9
Electricity	73.6	8.6	0.2	60.8	24.6	13.4
Chemistry	63.2	20.0	1.1	60.0	32.8	14.7
Sanitary engineering	85.4	3.6	1.8	69.1	18.2	3.6
Mining	66.7	15.9	2.9	60.9	36.2	23.2
Metallurgy	78.7	-	-	70.2	23.4	12.8
Geodesy	69.7	6.1	3.0	51.5	27.2	9.1
Others	65.2	10.4	0.9	54.8	27.0	13.9

It will be seen that:

(a) the lectures were most popular, judged by frequency of viewing, among the students of chemistry, mining, mechanics, civil engineering, in that order;

(b) more students of mining and, in second place, of chemistry assessed the lectures as valuable than other students;

(c) the relatively high percentage of respondents studying mining who believed that if they had not watched the lectures they would have obtained worse results is striking;

(d) the greater the percentage of viewers and, more particularly, of systematic viewers, the more effective the lectures appear to have been for students of that specialization.

13. Several analyses, for which the tabulated data are not reproduced here, were concerned with divergencies between the content of the television lectures on some subjects and the knowledge of these subjects required at the examinations in some faculties. For example, 2.8% of the systematic viewers of the lectures on mechanics of material were civil engineering students but only 0.8% of systematic viewers of these lectures who were studying civil engineering said that they were asked questions giving them the opportunity to present knowledge acquired from the lectures. Similarly none of the 4.3% of students of mining systematically watching the lectures on mechanics of materials found himself asked questions at the examination concerning mechanics of materials learnt from the television lectures. The results seem to confirm that divergencies exist between the curricula which adversely affect the usefulness of the television lectures.

Effectiveness of the consultation centres

14. Among those watching the lectures for the second year of studies individual viewers constituted 89.2% of the respondents; 8.9% of the respondents watched them in television consultation centres, and 1.9% in other groups. Among those taking part in the activities of the centres, 22% estimated the assistance of consultants as decisive in mastering the material of the lectures, 49% considered it as considerable, 14% stated that it was of no importance and 15% did not express an opinion.

15. Most of those attending the centres were employees of industrial enterprises. The percentage of persons employed in industry among all respondents was 53%, whereas among the respondents attending the centres it amounted to 70.7%. The percentages of persons employed in transport and building concerns among those attending the centres were the lowest. This was to be expected because persons employed in transport work irregular hours and in building enterprises such factors as, for instance, the dispersion of staff make it difficult for the management to organize or support centres. There were few participants among employees of ministries, offices and management concerns in comparison with employees of industrial concerns. But there was considerable attendance by management staff of industrial enterprises.

16. The following table presents the comparison of opinions of the participants at television consultation centres and individual viewers concerning the usefulness of the lectures.

	Of no importance because of infrequent viewing	Of no importance in spite of frequent viewing	Made studies easier	Made studies much easier
Individual viewers	52.5	4.3	34.1	2.9
Participants at the centres	16.9	16.9	60.8	3.8

(The percentage do not add up to 100, because the group of persons who had dropped studies in the meantime, was not taken into account)

These figures suggest that the essential value of the centres lay not so much in the method of teaching, assistance from the consultants, etc., as in the very fact of the mobilization of people who enrolled to watch the lectures systematically. Nobody was concerned if an individual viewer was watching lectures on a given day or not. But absence from the consultation centre was a matter of interest to the consultants and colleagues and, given the organized character of the centre's activities was considered like absence from classes in higher school.

17. A further more objective index of the usefulness of participating at the centres is indicated by the following comparisons. 1.1% of the respondents failed the examination in electrotechnics but there was no such case among those attending the centres. As for mathematics 2.6% of the respondents and only 0.8% of those attending the centres failed the examination. For mechanics of materials 1.4% of the respondents and 0.8% of those attending centres got unsatisfactory marks. For physics the situation was different: 1.2% of the respondents and 1.5% of those attending centres did not pass. It should be added that the percentage of participants at centres who got unsatisfactory marks in subjects not dealt with in television lectures was larger than for the respondents in general (5.4% and 3.4% respectively). This suggests that the participants at centres were, on average, rather less clever students. Finally, 92.3% of the respondents did not get any unsatisfactory marks in the second year of studies and the corresponding percentage for those attending centres was 93.8%. Although these differences are small and the persons attending the centres constituted a small group in relation to the total number of respondents, nevertheless, one is led to the opinion, at least provisionally, that participation in the activi of the centre gave better results than individual viewings.

18. In concluding these thoughts about the usefulness of the centres, it should be recalled that 11.4% of the respondents did not watch the lectures because they did not have television sets at home. Among nine major obstacles to watching the lectures the lack of access to a television came third. It seems certain that if there had been many centres, the majority of the 11.4% for whom the lack of a set was the main reason for not watching the lectures would certainly have attended them and, as people once enrolled at centres usually became systematic viewers, the percentage of such viewers would be certainly greater than 10%, perhaps even 20%. It seems that the problem of the television consultation centres should be a matter of special concern to the organizers of the "Television Polytechnic".

14. THE "TELEVISION POLYTECHNIC" LECTURES AS AN AID FOR THOSE TAKING EXTRA-MURAL EXAMINATIONS

Zofia Wańkowicz

1. In relation to activities of the "Television Polytechnic", the Ministry of Education and Higher Schools undertook an experiment in organizing extra-mural examinations on the first year course of vocational studies for workers. This introduced a new form of education at the university level (besides the evening and extra-mural courses) for people wanting to study who had graduated from, at least, secondary school and had proper professional experience, and which allowed the students to continue with their professional jobs. The regulations provided that:

candidates could take examinations during four successive sessions,

the number of examinations in each session was optional, but the sequence of subjects could not be changed,

failing to pass one examination in the session did not exclude the possibility of taking it in successive sessions,

student privileges were not granted to candidates while preparing for and taking examinations,

successfully passing the obligatory examinations qualified a candidate for admission to second year studies of any higher technical school running evening or extra-mural courses, for obtaining student registration and, consequently, student privileges.

2. This system of admission to studies differs greatly from the obligatory system of recruitment. Candidates do not take an entrance examination and take the examinations at the time at their convenience and repeat failed examinations. The decision to sit for the extra-mural examinations can be declared in any session. The persons taking extra-mural examinations need not attend obligatory classes. This is of special importance for those living in small towns situated far from university centres and for people overcharged with family and professional duties. On the other hand, they rely exclusively on themselves to master the course. For them the television lectures of the preparatory course for candidates for higher schools and the lectures covering the first year of studies were to be the teaching aids.

The aim of the research

3. The aim of research was to obtain answers to the following questions:

(i) What were the characteristics of the population participating in the experiment of taking extra-mural examinations for admission to higher technical schools?

(ii) To what degree was advantage taken of the "Television Polytechnic" lectures in preparing for examinations?

(iii) What was the rôle of the lectures in preparing for examinations?

The method of collecting information

4. In February 1969 the Inter-University Institute for Research on Higher Education asked all higher technical schools to provide records of those admitted to studies within the framework of the experiment and records of candidates for admission. It emerged that only thirteen persons succeeded in the experiment. The procedure was repeated in 1970 and information concerning 576 persons taking extra-mural examinations were obtained. Among them there were chosen 80 who were entered as students of the second year of studies and 89 who were just taking examinations. A questionnaire was sent to all of these. The 576 persons and those chosen from among them, were attending courses for workers run by ten technical universities and eight higher engineering schools spread throughout the whole country.

Characteristics of the population of respondents

5. Completed questionnaires were received from 110 of those to whom they were sent, i.e. 66%. Replies were received from 71% of the women and 64% of the men to whom it was addressed and by 81% of the candidates who were already entered on the student's roll or had just passed the first year examinations, and by 52% of the persons who, at that moment, were taking the first year examinations or were continuing to take examinations.

6. Half of the respondents were inhabitants of academic centres provided with libraries, scientific bookshops and an additional privilege, namely, the possibility of attending evening course lectures. Inhabitants of places where consultation centres exist constituted 16.4% of the population. The remaining 33.6% of the respondents lived in places where there were no such facilities, and almost half of these lived in places with less than 10,000 inhabitants. Men constituted 79.1% of the respondents and women 20.9%. The largest group, 40%, consisted of young people of twenty to twenty-four years. People of thirty to thirty-four constituted a little smaller percentage.

7. Nearly 42% of the respondents had passed their secondary school final examinations within the last five years; 38% of them had graduated in the 1950's. As regards women, 48% of them had passed secondary school final examinations within the last five years while 43% of the men had graduated from secondary school in the 1950's. These indicators are closely connected with the structure of the respondents regarding age.

8. More than half of the respondents were graduates from vocational schools, 38% from secondary schools of specializations in line with those of their studies and 15% from schools of specializations different from those of the chosen faculties. As regards women, 17% of them were graduated from vocational secondary schools exclusively of specializations in line with those of their studies, and the remaining 83% were graduates from grammar schools. As far as men were concerned, 37% were graduates from grammar schools, 43% were graduates from vocational secondary schools of specializations in line with those of their studies, and 20% were graduates from vocational secondary schools of specializations different from those of the chosen studies.

9. The analysis of the structure of population of the respondents by age and completed secondary school education indicated that 83% of the women were young graduates from grammar schools, thus persons with little professional experience and no professional qualifications. The men were older and had more professional experience, and 63% of them had professional qualifications.

Student experience preceding present studies

10. 70% of the respondents had already applied for admission to higher school, 64% of them for day courses and 36% for courses for workers. Regarding specialization 43% of the respondents had applied for admission to studies of specialization in line with their present ones and 17% had applied for admission to studies of different specialization covered by the courses of technical higher schools, and 7% had applied for admission to studies of specialization entirely different from their present ones.

11. The percentage of people who had studied previously and had gone on to, at least, second semester of studies was 19%. 38% of the respondents had not succeeded in entering higher school, and almost half had failed to pass the entrance examination.

Motives for undertaking studies

12. Among the motives mentioned in the questionnaires, the wish to raise or to complete qualifications took first place. Motives, such as interest in a given branch of science, desire to learn or to study some particular phenomena came second. Often, the motive was ambition or desire to acquire a diploma as the means of advancing in the social hierarchical ladder.

Choice of the extra-mural way of entering higher school

13. The distribution of reasons given for choosing the extra-mural way of entering higher school is given in the following table.

	%
Convenient examination schedule	41.8
Lack of necessity to pass entrance examinations	24.6
Possibility of not missing a year	18.2
Conviction that this is the best way for self-taught people	2.7
Lack of answer or given general answer	12.7
In total	100.0

The convenient examination schedule was the reason for the choice of extra-mural form of entering higher school.

What was expected of the "Television Polytechnic" lectures by the viewers

14. Nearly half of the respondents (48%) felt that the lectures should make it easier to master material contained in the textbook, 22% expected that the lectures would replace the lectures which students of day courses could attend in higher school, and 15% that the lectures would help in checking material which they had already learnt.

Rôle of the lectures in preparing for extra-mural examinations

15. 78% of the respondents stated that they decided to sit for the examinations because they had been able to watch the lectures. 26% of the population of respondents said that they had been able to watch the lectures, but that this had not made them decide to take the examinations.

16. The lectures on mathematics were the most popular with the respondents, and the lectures on physics and descriptive geometry were a little less popular. This and the regularity of viewing are shown in the table 1 below.

Table 1

	Mathematics	Physics	Chemistry	Technical Drawing	Descriptive Geometry
Systematically	39.1	28.2	11.0	10.0	25.4
Some lectures	44.5	40.0	38.6	24.4	36.4
Not at all	15.4	30.9	54.5	62.7	37.3

17. The distribution, in percentages, of answers concerning how the viewers watched the lectures was as follows:

individually at home or at neighbours	66.4
individually at place of work	3.6
at home or at a friend's with a colleague	7.3
in group - at place of work	0.9
in group at the centre of the General Technical Organization or at a consultation centre and also individually at home	2.7
did not watch the lectures	13.7
insufficient date	5.4

It is noted that although there were few consultation centres in the country, a larger percentage of students of evening and extra-mural courses attended them than of people taking extra-mural examinations.

18. The distribution, by percentages, of main reasons given by 80% of respondents who did not watch the lectures was as follows. Column 1 of Table 2 below indicates the essential reason and Column 2 other reasons.

Table 2

	1	2
Time of telecasts conflicted with other obligations	44.6	11.8
Lack of television set and other possibility of viewing	7.3	-
Too great rate of lecturing	7.3	11.8
Belief that the lectures were of less use than studying textbooks	5.5	5.5
Lectures not sufficiently comprehensible	3.6	2.7
Faulty reception of telecasts	2.7	3.6
Lectures not in accordance with curriculum of higher school	1.8	6.4
Possibility of attending lectures in higher school or in courses organized by political, social groups	1.8	6.4

It can be seen that the clearly major reason was the inconvenient time of the telecasts.

Usefulness of the lectures

19. More than half of the respondents said that the lectures were of considerable help in preparing for the examinations, and 6.4% of them attributed to the lectures their success in entering higher school. 21% said that the lectures were of little use and 13% that they did not watch the lectures.

20. The distribution of answers to the open question: "What help did you get from watching the lectures for the first year of studies?" was as follows:

The lectures made it possible to pass the examinations	7.3
replaced classroom lectures in higher school	0.9
encouraged me to work regularly	4.5
taught how to approach the subject and how to think	11.8
made it easier to understand the more difficult part of the material to be learnt	29.1
made it possible to check knowledge already acquired	6.4
made it possible to understand thanks to films phenomena which could not be explained by the best lecturers	5.5
helped in mastering particular subjects	8.3

3.6% said the lectures were of help but gave no reason. 1% said they were of no use. 13% did not watch. The rest did not answer.

21. The respondents made 106 comments and suggestions related to increasing the usefulness of the lectures. Most remarks concerned the inconvenient time of the telecasts. Respondents stated that the first telecast of a lecture took place when they were still at work or on the way home, and it was repeated so late that they were too tired to watch it attentively. There were complaints about divergencies between the curricula of the lectures and of the higher school as well as between the contents of textbooks. They asked that the rate of lecturing should be reduced and that more time should be given to solving and to discussing more difficult parts of the material. The respondents wanted each lecture to be a separate whole, which would be of help to people who could not watch the lectures systematically. They also suggested that the number of lecture units should be increased and that there should be television classes on the day after the lectures and control tests to enable viewers to see whether they had correctly mastered the subject. Respondents said that always having the same lecturer in a given subject guaranteed a certain continuity of presentation and of uniformity of symbols etc.

Conclusions

22. The opinions obtained by the way of posted questionnaires came mainly from the persons who

succeeded in passing examinations, and that should be taken into account in arriving at conclusions. Among those who entered on technical studies by the way of the extra-mural examinations the majority were inhabitants of big towns and were men of more or less 10-years' professional experience, who had graduated from vocational schools, for whom studies were an opportunity to raise qualifications or to change a profession. There were less women, they were younger, and most had graduated from grammar schools, and had relatively little professional experience; for them studies were an opportunity to acquire a profession. The majority of the persons taking extra-mural examinations were trying, not for the first time, to be admitted to higher studies. They chose the new system because of the convenient examination schedule and the lack of necessity to pass an entrance examination.

23. As regards the rôle of the "Television Polytechnic" in the experiment, nearly 70% of the respondents said that they decided to study because of its activities. But the regularity of watching the lectures varied and depended on the subject. Mathematics was the most popular subject, then physics and descriptive geometry. Chemistry and technical drawing were less popular. A very small percentage of the respondents watched the lectures systematically. This was due to the inconvenient time of the telecasts. Those taking extra-mural examinations found the television lectures useful in their studies and many were of the opinion that the lectures helped them in succeeding in entering higher school.

24. The experiment ended after four years. The reason was that there were too few candidates and that their level of preparation was insufficient. The extra-mural form of studies and, above all, of getting credit for the course of first year of studies is more difficult than the traditional one. It calls for strong motivation, much discipline, systematic work, persistency and ability to study without control for a long time. It also involves expenses for travel to take the examinations and for purchasing textbooks and manuals. Making it possible for those taking extra-mural examinations to use higher school lending libraries, and have consultations with the academic staff of technical higher schools and covering travel expenses or granting reduced-fare tickets could contribute to enlarging recruitment and to the efficiency of the efforts made by these students. It is believed that changing the time of telecasts asked for by the respondents as well as more efficient distribution of materials for lectures would be of great importance. The last remark relates both to the extra-mural examinations experiment and to all forms of studies for workers. People who are already working who want to raise their qualifications must be prepared to take on a heavy load of studies. At the same time, it is necessary to create contions in which an average potential candidate could cope with his job of work, his family life and his studies.

15. ASSESSMENT OF THE ACTIVITIES OF THE "TELEVISION POLYTECHNIC" AND FINAL CONCLUSIONS

Janusz Tymowski and Jersy Zakrzewski

1. This assessment and these conclusions are based on five years' activities of the "Television Polytechnic".

Functions of television lectures at university level

2. Television lectures at the university level can be of:

complementary and enriching character;
auxiliary and multiplying character;
basic character.

In the first case, the lectures present to students attending classrooms lectures, material which cannot be presented in the laboratories of some higher schools because of lack of special equipment and high costs of presenting it. In the second case, the lectures are designed to assist classroom lecturers of less experience. The television lectures are integrated with classroom lectures, and the lecturer replaces a part of his lectures by watching the television lecture with students and afterwards discussing questions arising from it. In higher schools located in small centres and at evening courses, television lectures might account for 20% to 40% of the time. In the third case, the television lectures are intended for students of extra-mural courses and, with textbooks, constitute the base. The lectures should cover, at least, 50% of the material under study and all the parts which demand special efforts and are the most difficult to be understood just from reading a textbook.

Higher school courses and television lectures

3. Three organizational approaches are possible:

the television authorities are in full charge; and
the central education authorities are in full charge;
the two authorities collaborate in planning, scripting and producing the lectures.

The first approach is possible only when the telecast lectures are loosely linked with the curricula and courses in higher schools. When the telecast lectures are to convey information necessary for getting a given degree or diploma or to cover the subjects in approved programmes, only the two latter approaches can be taken. Certifications that a given amount or level of knowledge or skill has been acquired can only be made by authorized educational institutions. Consequently, concordance of television lectures with the requirements laid down by the educational authorities is necessary for those who base their studies on the television lectures. Moreover, educational and school programmes are telecast within the framework of concessions that have been granted or of arrangements for paying for television time by the education authorities. These telecasts conflict with the interests of the mass of telespectators and, consequently, the number of them is bound to be limited. The creation of a separate television system by educational authorities can only be justified when there is no nation-wide television. Independent educational television stations are organized as institutions attached to higher schools. Generally, they are of very little power, and cover the territory of one urban agglomeration (such stations are popular in the United States). The collaboration between educational authorities and the television organizations is the best approach to telecasting courses at the university level by a nation-wide television system. The educational authorities are responsible for the programming and for organizing reception and the television authorities are responsible for technical production and emission.

4. Programming covers concepts and decisions regarding the scientific level of lectures, lines of specialization in studies for which the lectures are to be intended, subjects and contents, and textbooks on which the lectures are to be based.

5. Production by the television authorities should be realized in close co-operation with higher schools and academic lecturers. Specialized television editorial units are needed to prepare the lectures and it is necessary to appoint a co-ordinator

of the lecturers on a given subject or in a given specialization.

6. Organizing reception comes within the duties of the educational authorities and higher schools taking advantage of the television lectures. This can be done by including viewing of the telecasts within the activities of the higher schools or by setting up the special television higher schools. The first solution is more effective. It eliminates distrust of the higher schools towards this new form of instruction, ensures uniformity of requirements, makes it possible to base work with viewers on the existing extra-mural courses, and gives the possibility to viewers to enter higher schools at any point of a university course.

The disadvantage of this system is a tendency to subordinate the new method of instruction to the established customs of higher schools and to the convenience of the academic staff. The independent school gives full freedom to experiment in efforts to obtain the optimal results. But there is a danger that proper standards may not be maintained. The television higher school has to provide the students with the necessary teaching aids, arrange for consultations, ensure the possibility of attending laboratory classes, and organize final tests and examinations. Moreover, the television higher school would face difficulties in passing its students to other higher schools, especially for studies which were not subject of specialization at the television higher school.

Organizing instruction of extra-mural students

7. The instruction of students of extra-mural courses is based on the television lectures supported, perhaps, by radio broadcasts and by special textbooks and booklets. The students should also have the possibility of attending consultations and of participating in seminars and laboratory classes.

8. Because of cost and the limited hours of television emission, the number of television lectures must be rather limited. The lectures cannot cover all the material included in the prescribed curricula of higher schools. Thus, a very careful selection of topics for the lectures is necessary. The subjects best suited are those which give an opportunity for the full application of visual aids, which are not, in general, at the disposal of higher schools, such as animated films and film clips presenting phenomena or processes which cannot be presented to the viewers otherwise. The television lecture must, basically, satisfy the same conditions laid as a good classroom lecture. At the same time, it has its own specific features. The television lecture is the result of team work. Besides the scientist who elaborates the content, the team includes the producer responsible for presenting the lecture so as to have the maximum effect on the viewers, and a specialist in audio-visual aids. During the actual telecast, the lecturer has at his disposal, besides, if required, an assistant to present experiments and the specialists in light and sound. On the other hand, he has no class in front of him and, thus, has no opportunity to know how his lecture is being received.

9. Not every good higher school lecturer is a good television lecturer. The conditions of the television studio, the necessity of team work, the lack of audience, and, at the same time, the consciousness that the lecture is being watched by thousands call for some part of "theatrical art" in face of cameras and microphones which demand special qualities of voice and appearance and of character. With the "Television Polytechnic", the best results were obtained by outstanding young assistant professors who were ready to experiment and were not afraid of criticism of their colleagues. Because viewers get used to a lecturer, it seems also desirable that one person should give all the lectures on a given subject. However, since the preparation of a television lecture takes much more time and work than are needed for a classroom lecture, this can be difficult to arrange. Experience suggests that one lecturer should not prepare and present more than 8-12 lectures of 30 minutes in one semester.

10. The television lectures in themselves are not sufficient. Textbooks are of greater importance for students of extra-mural courses because the television lectures do not cover all the material included in the curricula of higher schools, and for students of extra-mural courses the textbook is the only element which brings together particular television lectures. Students should also be provided with information books containing the full programme of the course to be covered by the television lectures, the main themes of each lecture and references to appropriate chapters in textbooks. Because the textbooks may not meet the needs of viewers, it is desirable to provide them with the texts of the lectures, if possible, before the television lectures are given.

Organizing reception

11. Students of television lectures should have the possibility of getting explanations and checking knowledge by doing exercises and solving problems, etc. Hence, the need for arranging consultations. In bigger centres, the best results are obtained by organizing consultation centres with a teaching staff in different subjects. In such centres, the work is organized in groups of 20-30 persons, and the lectures are watched under the supervision of a specialist who, for 5 to 10 minutes before a lecture, presents the main points of the lecture and afterwards answers students' questions, etc. The consultant should try to engage actively all the members of the group. For scattered viewers, it is recommended to organize smaller viewing groups for discussion and mutual aid. In all cases, however, the help of consultants should be ensured. The best solution is to organize a network of

consultants who come from local teachers at secondary schools and specialists working in industry recommended by the higher schools. Local technical associations and trade unions can help. Consultants should have periodic meetings in the higher schools to exchange experiences and get guidance.

The time of telecasting the lectures

12. The time of telecasting the lectures is a basic problem. Since the lectures are watched by a relatively small number of viewers, the television authorities offer inconvenient times for the telecasts, too early or too late. More convenient times are offered only where programmes are emitted on several channels. The television lectures are most needed in places located far from big centres and, consequently, must be emitted on channels covering the whole country. The most appropriate time for telecasting the lectures is when the classes on the evening courses are held, because it gives an opportunity of integrating classroom and television lectures. An optimal solution is recording the lectures on tape and distributing copies to higher schools. This is, however, very expensive, because of necessary capital expenditure. When a higher school or consultation centre is provided with the equipment for reproduction from video tape or through a close-circuit network it can organize lectures at its convenience. Individual video-tape recorders, which enable viewers to record a lecture and to reproduce it even several times create still greater possibilities. In such cases, the higher school can organize a lending tape library. However, it is still recommended to continue the lectures by telecast because these arouse viewers' interest, popularize science and technology and raise the standard of lectures given in secondary schools by showing examples of good lectures, etc.

Didactic experience

13. The "Television Polytechnic" was designed as a supplementary teaching method in the system of technical studies for workers. The television authorities collaborated with higher schools in conveying theoretical knowledge. To meet viewers' needs to make the best use of the lectures, the television authorities organized teaching aids for students and television consultation centres to give assistance to individual students but these possibilities were limited. Therefore, the television lecture was itself the main centre of instructional activity and much didactic experience was gained in that area. Experience in activities to support the television lectures was less extensive but of practical importance. The rôle of information books and television textbooks was defined to some extent. But it was impossible to investigate the effectiveness and methods of work of the consultation centres. They were in action for only a short time and even during that time they were not, for many reasons, the place of systematic group watching.

14. The results of research on effectiveness of the television lectures as an aid for students of technical courses for workers did not confirm the assumption that persons watching the lectures systematically should obtain really better results than other students in studies and examinations. It appears, rather, that the lectures were watched, above all, by students who faced bad conditions for study and who could, thanks to the lectures, manage to get credits for first- and second-year studies.

Experience gained and conclusions regarding the research itself

15. The research strategy, imposed by the course of events, was based on investigations into successive current activities and this limited the range of research. However, important research was done on the social incidence of technical studies for workers, the recruitment basis of the viewers, the assessment of the didactic effectiveness of the lectures. Objective information was obtained on the first two subjects and very full information was collected on the value attached to the lectures by the viewers. On the other hand, the research team did not succeed in getting sufficiently exhaustive and objective information concerning the didactic effectiveness of the lectures.

16. It seems that new research should be aimed, in parallel, at two objectives:

(a) to foresee developing prospects for the use of television in higher education and, thus, to influence the structure and organization of educational television institutions;
(b) to discover basic interdependencies occurring in the process of instruction by or assisted by television so as to define ways of increasing the effectiveness of the educational television system.

It is also necessary to intensify research on the present system of television studies. To define the effectiveness of the lectures, it is necessary to investigate the whole system of the "Television Polytechnic", the programme of studies, methodology of television lecturing, the provision of teaching aids, and the operation of consultation centres. The research programme, techniques and instruments should be uniform and should not be changed during successive years. The Ministry of Education and Higher Schools and the Polish Television should take part in a large research programme of which the co-ordinator would be the Inter-University Institute for Research on Higher Education.

Future activities of the "Television Polytechnic"

17. The preparatory course for candidates for studies and the course for the first year studies for workers are permanent items in the higher school system. Extending the programme by reintroducing lectures for second year studies has been impossible due to the lack of time on the first channel, which is the only channel covering all the country. It is only possible to telecast the lectures before 3 p. m., and teachers are the only large professional group who can watch telecasts at that time. In this connexion, it is planned to introduce, besides the courses for school teachers in mathematics and physics, courses in biology and chemistry, and so make it possible for teachers to acquire higher education while continuing to work.

18. In October 1970, the second channel came into operation. While it covers, so far, only several bigger urban agglomerations, it can offer more convenient time for telecasts, up to 6 p. m. It is proposed to use this channel for courses for working people who have graduated from higher schools. Two kinds of courses are foreseen:

(a) the courses of 20 to 30 thirty-minute lectures on subjects such as statistics for civil engineers. The students of these courses would not, as a rule, get credits for the courses nor any diploma.
(b) Post-graduate courses of 60 to 80 lectures combined with seminars and laboratory classes organized in higher schools and research institutes. The students would get a diploma. The theory of information-processing would be the subject of one such course.

16. PROSPECTS FOR DEVELOPMENT OF TEACHING BY TELEVISION IN POLISH HIGHER EDUCATION

Franciszek Januszkiewicz

1. The Polish education system aims at providing life-long education for all adults. It provides for developing education on the level higher than secondary (post-secondary vocational studies, and refresher courses, etc.) and higher education for graduates from higher schools (post-graduate studies, centres for training management staff, specialized courses, etc.). Life-long education is not a concept designed for privileged, closed and limited social and professional groups. It is rather a response to the common demand for knowledge, which is the result of general social and technological progress. Nor is its purpose limited to the acquisition of knowledge for professional reasons; it is aimed at the development of the human personality in a period of intense change. It calls for a new organization of educational institutions so that their activities are closely related to social needs and more effectively correlated and co-ordinated. Moreover, without in any way denying the rôle and value of small educational institutions, it can be stated that education in the future will be largely based on the means of mass communication and above all, on television in all its technical forms. It is to be expected that co-operation between higher schools and mass communication organizations will be much closer than it is at present and that television will be a major contributor to educational progress.

2. The achievements till now of the educational organizations in the modernization of teaching processes, including the use of audio-visual means, have not been satisfactory. Television is becoming more and more a common language and its influence in shaping human thinking and attitudes cannot be overestimated. Television is a form of mass communication which is very attractive to youth. This fact must be accepted by the schools which will need not only to make use of television more commonly during lessons in the school but also to make use of non-school telecasts. For educational telecasts, especially at the university level, it is possible to call on the services of outstanding specialists who, besides the technical possibilities of television, have at their disposal equipment and resources not generally available to schools.

3. Telecasts by outstanding teachers can spread good teaching methods and recorded on videotape can be repeatedly used. The schools themselves, faced with pressure of classes and lack of teachers will also be able to record their own lectures and repeat them. Lectures can be recorded at any time and made available to schools and universities for them to use on the days and at the hours that suit them. This will be of particular value to the work of the consultation centres. The coming of colour television will further develop the range of educational television. The development of transmissions by satellite, for which the building of a ground station is foreseen by 1976, will make possible the improvement of international exchange of television programmes.

4. To match these possibilities an intensive programme of modernization of television and radio stations between 1971 and 1975 is being carried out. Television centres are being extensively equipped for recording colour telecasts (and radio stations with equipment for recording the radio programmes, including stereo programmes). Black-and-white equipment is being replaced by colour equipment. The production of colour television sets will start in 1975. The increase of the number of television sets is shown, in thousands, in the following table:

	1960	1965	1969	1970
Owners of sets	426	2,078	3,828	4,215
Owners of sets living in the country	50	335	925	1,077

5. In 1970-1971 the television emitted 340 school programmes for pupils of primary and secondary schools and 63 programmes for agricultural vocational schools. In the same year, the "Television Polytechnic" emitted

146 lectures of the preparatory course for the candidates for higher schools,
198 lectures for students of first year of studies,
40 lectures for secondary school teachers in mathematics,
20 lectures for secondary school teachers in physics.

6. The experience of the "Television Polytechnic" has shown that television can be successfully used in higher education but that it cannot create self-dependent educational forms. The experience of the "Television Polytechnic" suggests that the most rational way of using the television in higher education is to create new educational concepts, practices and institutions based on the existing network of higher schools. It is not useful to duplicate classes organized in higher schools with television lectures. On the other hand, the television lectures are not by themselves a sufficient form of aid for students of extra-mural courses. These problems were not sufficiently realized or tackled and, hence, the results of the "Television Polytechnic" have been less than might have been expected given the effort and money which went into the experiment.

7. It has been suggested that there should

be set up a "Radio and Television University for School Teachers", to be organized by a group of specialists collaborating with the Inter-University Institute for Research on Higher Education and, of course, in close association with the Ministry of Education and Higher Schools and Polish Television. A general outline of the project can be given but details are to be worked out and may lead to some modifications. The Radio and Television University would be primarily concerned with school teachers who constitute a large professional group and for whom the constant improvement of qualifications is essential to good work by them.

8. The Radio and Television University would come into operation in three successive stages:

I.

Courses, for 3 semesters, for teachers who graduated from the former two-year course teacher-training colleges. In 1969-1970, out of some 297,000 teachers and tutors, nearly 156,000 had obtained credits after the two-year courses which were not considered as of university level. In 1968-1969 three-year course colleges were created to educate teachers for primary schools and the two-year course colleges were ended. From 1970, recruitment to two-year teachers' courses for workers was also stopped and in 1971-1972 colleges were set up to provide extra-mural three-year vocational courses for teachers who were graduated from pedagogical vocational secondary schools. In 1968-1969 there were 97,000 such teachers. Making it possible for these two groups of teachers to raise their general and professional qualifications is a task of basic importance. They form a potential audience for the Radio and Television University of some 250,000 viewers.

II.

Courses, for 4 semesters, for graduates from teacher-training colleges carrying on day, evening and extra-mural courses who wish to acquire the second, i.e. Master of Arts, degree. It is foreseen that in 1972 when second degree courses are started some 4,000 people will graduate from teacher-training colleges running day courses and courses for workers. They will constitute the natural recruitment basis for the second degree courses and the potential viewing audience. Acquiring the Master of Arts degree warrants promotion from the rank of primary school teacher to the rank of secondary school teacher.

III.

Post-graduate courses, for 1 to 4 semesters, for school teachers who have taken the M.A. degree or have graduated from teacher-training colleges. In 1972 the potential audience for courses organized by Radio and Television University would be 50,000.

9. There would be an independent board of management for the Radio and Television University to supervise and co-ordinate activities and within it a Programme Committee in charge of production. The Ministry of Education and Higher Schools, as with the "Television Polytechnic", would be responsible for approving the programmes and for establishing the list of radio and television lecturers. The Ministry would ensure proper arrangements for viewing the lectures in higher schools, and with the publishers would arrange for publishing text-books, booklets with exercises to be done etc. The Radio and Television Commission would be responsible for arranging the emissions at appropriate times. The basic lectures would be transmitted by television, and radio would be used for lectures for which visual images were not important. The research institutes and, first of all, the Inter-University Institute for Research on Higher Education would organize thorough research into functioning and methodological seminars for the lecturers.

10. The conception of the Radio and Television University is based on the integration of experience resulting from the activity of the "Television Polytechnic" and experience gained over many years of the functioning of the system of studies for workers and correspondence schools for adults. The objective is to create an educational institution which will be modern in every respect. While the schools and universities are the basic source of knowledge, at least at certain periods of life, they are not the only source. The media of mass communication play an increasing rôle in the life-long education for all. This is why the Radio and Television University, besides organizing and emitting its own strictly instructional programmes, should take advantage of the educational potential of other television and radio broadcasts.

11. In organizing television courses to assist and promote post-graduate studies, wider use should be made of local television and radio centres. At present, all television lectures are centrally organized, even when local television centres are associated with the activities of the "Television Polytechnic". But different branches of the national economy are concentrated in defined regions of the country. The higher schools located in these regions instruct students in the specializations relating to the needs of local industries; it seems sensible to organize similar regional post-graduate studies. For instance, Polish mining and metallurgy are concentrated in the Cracow and Katowice regions, where are located the Silesian Technical University, the Cracow Technical University and the Academy of Mining and Metallurgy in Cracow, and in Lódź which is the centre of the textile industry, there is the Lódź Technical University.

12. For the future, therefore, it is possible to envisage the continuation of the "Television Polytechnic" primarily intended for workers wishing to undertake higher technical studies, the creation of the Radio and Television University for School

Teachers, and the organization of television courses for post-graduate and highly specialized studies. The importance of closed-circuit television at university level education has not been discussed here.

13. It remains to recall one last, and not least important, aspect of the rôle of television in the education of the masses. Experience gained during the operation of the "Television Polytechnic" showed that the actual audience of viewers of the television lectures became different and greater in number than the audience of viewers for whom the lectures were intended. This was a success that was not expected and it should be given proper attention in future operations. There exists throughout society, at all levels a desire for knowledge stimulated by the progress of science and technology which can be exploited in the service of planned instruction by the educational authorities. The institutions of mass communication, on their side, should constantly respond to this desire given the obvious need to support the efforts of the schools by parallel forms of education.

14. Television has not yet been fully discovered by education policy makers and education authorities. Nor have its possibilities been understood and appreciated by teachers at different levels. But a radical change of attitude is to be expected in the near future. School and universities, even supplemented by evening, extra-mural and correspondence cannot by themselves fulfil all the needs for mass and life-long education. Among the media of mass communication television in its different technical and organizational forms (nationwide, local, regional and international satellite emissions, closed-circuit, video-tape and cassette recordings) is perhaps the medium which could be most effectively used in the effort to provide full access to education for all in the service of economic and social development. Perhaps the invention of television will be seen to have been as important as the invention of printing.

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